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MAN

EMBRACE

Origin, Antiquity, Primitive Condition,

RACES, LANGUAGES, RELIGIONS, SUPERSTITIONS,
CUSTOMS, PECULIARITIES,

CIVILIZATION,

NATURE AND CONSTITUTION, PHYSICAL STRUCTURE,

THE CARE AND PRESERVATION OF THE BODY, THE MENTAL
AND MORAL FACULTIES, ETC., ETC.,

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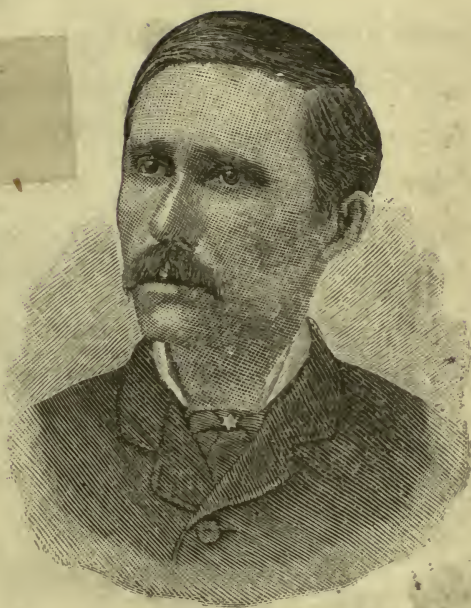
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PREFACE.

* * The author deems any lengthy preface to this work superfluous, but will insert instead merely the list of authorities whence the materials for "MAN" have been drawn. It is believed that no other book covers the ground occupied by this within the same space. The author acknowledges his indebtedness to Mr. T. S. Denison for invaluable aid in the preparation of the plan of the work, also in the revision of the MSS. and proof sheets. The book will speak for itself with regard to the liberality displayed in the way of illustration, paper, printing and binding.

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AUTHORITIES CONSULTED.

Ancient Monarchies.—Rawlinson.
 The Human Species.—Quatrefages.
 The Natural History of Man.—Quatrefages.
 Origin of Civilization and Primitive Condition of Man.—Sir John Lubbock.
 Pre-historic Times.—Sir John Lubbock.
 The Childhood of Religion.—Edward Clodd, F. R. A. S.
 Ten Great Religions.—Rev. James Freeman Clarke.
 Elements of Geology.—Le Conte.
 Intellectual Development of Europe.—Draper.
 Life of the Greeks and Romans.—Guhl and Koner.
 Gesta Christa.—Chas. Loring Brace.
 Races of the Old World.—Chas. Loring Brace.
 Anthropology.—Topinard.
 Anthropology.—E. B. Tylor.
 Ancient Law.—Maine.
 Uncivilized Races in all Countries.—Rev. J. G. Wood.
 The Ancient Egyptians.—Wilkinson.
 Vocabulary of the Philosophical Sciences.—Krauth.
 Annual Report of the Bureau of Ethnology, 1879-So.—J. W. Powell.
 The Iroquois Book of Rites.—Horatio Hale.
 Suicide.—Morselli.
 Suicide.—James J. O'Dea, M. D.
 China, A History of Laws, Manners and Customs.—J. H. Gray.
 A Book About Doctors.—J. C. Jeaffreson.
 Opium Smoking.—H. H. Kane, M. D.
 The Alhambra and the Kremlin.—S. I. Prime.
 Around the World.—Prime.
 The Chemistry of Common Life.—F. W. Johnston.
 Till the Doctor Comes, and How to Help Him.—George H. Hope, M. D.
 Curious Myths of the Middle Ages.—S. Baring-Gould, M. A.
 Curiosities of Olden Times.—S. Baring-Gould, M. A.
 Ancient America.—J. D. Baldwin, A. M.
 Pre-historic Nations.—J. D. Baldwin, A. M.
 Myths and Myth-Makers.—John Fiske, M. A., LL. B.
 Empirical and Rational Psychology.—A. Schuyler, LL. D.
 Principles of Mental Physiology.—William B. Carpenter, M. D., LL. D., F. R. S., etc.
 Mesmerism, Spiritualism, etc.—William B. Carpenter.
 History of Civilization in England.—Thomas Buckle.
 Development of the Human Race.—Lazarus Geiger.
 The Origin of Nations.—Prof. Geo. Rawlinson.
 Fashion in Deformity.—Dr. Wm. H. Flower.
 Facts and Fictions of Zoology.—Dr. Andrew Wilson.
 The Study of Words.—Richard C. Trench.
 Oriental Religion.—Dr. John Caird.
 Calculating Boys.—Richard A. Procter.
 Man's Place in Nature.—T. H. Huxley.
 Longevity.—John Gardner, M. D.
 The Human Race.—Louis Figuier.
 Buck's Theological Dictionary.
 Evolution of Life.—Henry C. Chapman, M. D.
 Primitive Manners and Customs.—James A. Farrar.
 Reconciliation of Science and Religion.—Alexander Winchell, LL. D.
 The Brain as an Organ of Mind.—H. C. Bastian, M. A., M. D., F. R. S.
 Mysteries and Crimes of Mormonism.—John H. Beadle.
 Wonders of the Human Body.—A. Le Pileur, M. D.
 The Life and Growth of Language.—William D. Whitney.
 Narcotics.—Dr. Geo. H. Beard.
 Man before Metals.—N. Joly.
 Germany seen without Spectacles.—Henry Ruggles.
 History of Germany.—Bayard Taylor.
 Origin of Species.—Darwin.
 The Descent of Man.—Darwin.
 Gray's Anatomy and the Physiologies of Carpenter, Draper, Foster, Dalton, and others.

I am indebted also to many articles in the Popular Science Monthly and other Scientific Journals and Reports, to the Encyclopedia Britannica, and other miscellaneous sources of information.

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BOOK I.

PRIMEVAL MAN.

CHAPTER I.

IDEAS OF VARIOUS NATIONS CONCERNING MAN'S ORIGIN.

In the intellectual infancy of a savage state, man transfers to nature his conceptions of himself, and considering that everything he does is determined by his own pleasure, regards all passing events depending on the arbitrary volition of superior but invisible power.

—*John William Draper*

The ideas of uncivilized peoples on such subjects take the general name of myths. A myth is to the uncivilized man what a hypothesis is to the man of science. Both are explanations of natural phenomena. Prof. John Fiske says, "A thing is said to be explained when it is classified with other things with which we are already acquainted. That is the only kind of explanation of which the highest science is capable."

The savage man sees the flash of lightning, he hears the rolling thunder, he sees the effect produced by winds and floods, or perhaps he feels the earthquake shock or witnesses the grandeur of a volcanic eruption, and his mind naturally asks for an explanation of these phenomena. His first and most natural conclusion is that these effects are produced by some being. This being must take some form in his imagination. Now it is a fact in mental science that the picture in the imagination is always made

up of parts of objects or existences which the individual has perceived. For an example, one cannot imagine an animal totally different from what he has actually seen. He may imagine an animal with the head of a horse and the body of a lion, and having wings like an eagle, and he may give it a name ; yet it is not a new animal, but simply a combination of what he has already perceived. One may imagine a mouse the size of an elephant ; but he cannot construct in his imagination an animal that is not in form like some other animal, or that is not made up of other forms which his mind has perceived through the senses. This imaginary being then, which produces these effects must take the form or be made up of the forms which the savage is familiar with.

This simple manner of explaining natural phenomena is characteristic of children. Indeed, the savage is but a child intellectually. His fondness for ornament is child-like. He is pleased with a rattle and tickled with a straw, as the child is. I remember when a child I constructed a theory of the universe which for the time satisfied my childish mind. The vast blue expanse we call the sky was to me a shell something like blue glass. This inclosed the world like the half of an egg-shell ; of what was under the earth I had no idea unless it was earth all the way down. Heaven, which I had been told was a happy place, and had heard called the "other world," I imagined was a place surrounded by a similar blue shell, and to go from one to the other, I should have to break through each of these shells and creep out of the one and into the other. I remember also, when quite small, the thought came to me, what makes the clouds move ? I had no theory to give, but asked an older sister. She told me that God made them move. I was satisfied with this so far as the explaining the movement was concerned ;

but I tried now to imagine what kind of a being God was; for I could think of nothing else than of a being, a personage, and this being would take no other form in my mind than that of a gigantic man, and I really imagined I could see a huge giant pushing the cloud masses before him. This leads me to say that in general the savage, like the child, is averse to exercising his mind in finding out the real cause of phenomena. It is the exception and not the rule for men in a low state of civilization to think or worry their minds very much about the causes of things. It is also true, as Sir John Lubbock observes, that "the mind of the savage, like that of the child, is easily fatigued, and he will then give random answers to spare himself the trouble of thought." Mungo Park, the celebrated African traveler, relates that when he asked the negroes what became of the sun at night and whether they should see the same sun next day or a different one, they considered his question as very childish. They had never had any conjectures in regard to it, considering such questions as beyond the reach of human investigation. Henry Walter Bates, a traveler in Brazil, asked a native what was the cause of thunder and lightning, and who made the sun, and stars, and the trees. He replied that he did not know and that he had never heard the subject mentioned among his people. Pope's lines are expressive as applied to the savage.

*"To be contents his natural desire
He asks no angel's wings or seraph's fire."*

Again, the savage is acquainted with no force except his own will, and he naturally imagines all objects which move or serve special purposes as endowed with volition, or will power. The Esquimaux, the Choctaws, and some other tribes make no distinction between animate and in-

animate objects in their language. The Fijians think that "vegetables and stones, nay, even tools and weapons, pots, and canoes have souls, that are immortal." The child in play, it may be noted here, addresses its play-things as though they were conscious beings.

These facts in regard to the nature of uncivilized man, explain in part at least, the origin of myths.

THE GREEK MYTH.

There was a time according to the ancient Greek mythology when all was chaos, that is, there was no distinction of solid land, nor sea, nor atmosphere, but all was a confused mass, yet containing the "discordant seed of all things." From this confusion the power of a superior being formed the universe.

The origin of man, according to this myth, was somewhat as follows: After the land had been separated from the waters one of the gods arranged the mountains and valleys, the lakes and rivers, the woods, plains and fertile fields. The air became clear, the stars appeared, the sea produced fish, and the land beasts and birds. A race of giants called Titans first inhabited the earth. Prometheus, it is said, made the first man by taking clay and kneading it with water. Epimetheus, the brother of Prometheus, then undertook to provide man and all the animals with faculties necessary for their preservation while Prometheus was to oversee the work. Epimetheus having distributed quite lavishly his gifts of courage, swiftness, sagacity, etc., to the animals, had none left for man. Prometheus, as a compensation, ascended to heaven for fire and brought it down to earth and gave it to man, who by reason of it could surpass all other animals for he could render himself independent of climate, cook his food and make tools to cultivate the ground.

But man was alone, and instead of making woman as a helpmeet for him, Zeus, or Jupiter, the leader of the gods created a woman and sent her to earth as a punishment to the brothers for having stolen the fire from heaven. This woman's name was Pandora. The gods, it was said, all contributed something to perfect her, one bestowing upon her music, another beauty, etc.

But how did she become a punishment to the inhabitants of earth? According to one account she found a jar in the house of Epimetheus, and her curiosity caused her to open it, when out there flew all manner of evils. The jar, however, contained Hope, which remained in the bottom, and was left to comfort mankind.

Another account makes Pandora bring a vase from heaven with her, and the curiosity of the husband prevailed and it was opened.

The earliest condition of mankind according to the Greek myth was that of innocence and happiness, and the poets called the first division of time the Golden Age. Then truth and justice prevailed. There were no laws nor magistrates, because none were needed. There were no weapons of war and no quarreling, nor fighting. Men did not need to labor, for the earth brought forth abundantly all that men needed or desired. The rivers flowed with wine and milk, and the trees emitted honey.

But after this there came the Silver Age. Then the year was divided into seasons, and men must endure the extremes of heat and cold. They must till the ground and labor for a living. This was followed by a Brazen Age, when men became savage in disposition, and wars and tumults broke out. Next came the Iron Age, which was worse than all. Crime became prevalent, Fraud, double dealing and all manner of wickedness was abroad. Men no longer owned things in common, but divided up the

land and accumulated wealth. The gods one by one abandoned the earth until all were gone. Zeus, enraged with this state of affairs, summoned a council of the gods and resolved to destroy the inhabitants of earth, and seizing a thunderbolt he was about to throw it down to earth, but reflecting that the fire might destroy heaven also, he changed his mind and concluded to drown it.

So the rivers and seas were let loose, and the rain poured down until all the earth was covered except Mt Parnassus, upon whose summit Deucalion and Pyrrha, a man and woman, found refuge.

When the flood subsided the pair sought a temple and prayed to the gods to tell them what to do.

The reply was: "Depart from the temple with head veiled and garments unbound, and cast behind you the bones of your mother." These words filled them with astonishment. Pyrrha said: "We cannot obey; we dare not profane the remains of our parents." Finally, after thinking awhile over the matter, Deucalion said: "Either my sagacity deceives me, or the command is one we may obey without impiety. The earth is the great parent of us all; the stones are her bones; these we may cast behind us, and I think this is what the oracle means. At least, it will do no harm to try." So they veiled themselves, picked up stones and threw them behind them. The stones, those thrown by the man, became men, and those thrown by the woman, became women, and thus was repeopled the earth, but it was a race of hardy beings well adapted for labor.

THE ANCIENT PERSIAN ACCOUNT.

The ancient Persian myth concerning the origin of man is as follows: There existed a supreme being who created two other beings, Ormuzd and Ahriman, to whom

he imparted much of his own nature. Ormuzd remained faithful to his creator and he was considered the source of all good in the world. He created man and furnished him with the materials of happiness. Ahriman on the other hand revolted, and became the father of evil. He marred man's happiness by creating ferocious beasts and poisonous reptiles and plants, and now good and evil are commingled, carrying on an incessant war with each other. But Zoroaster, the advocate of this doctrine, held the good will finally triumph over the evil, and Ahriman and his followers will be doomed to dwell in darkness forever and ever.

THE HINDOO STORIES.

Many of the Hindoos believe in Brahma as the great creator of the universe and men to be descendants from sons of Brahma who were heads of their respective castes. These sons were born of Brahma in the following peculiar manner: The one who became ancestor of the priestly caste issued from his mouth; the father of the warriors came from his right arm; the one who begot the agriculturists and traders came from his thighs and the ancestor of the lowest caste, or that of the mechanics and laborers, was born of the feet of Brahma.

Another Hindoo myth has it, that Brahma made a man and a woman, and placed them upon the island of Ceylon. He commanded them to remain on the island, but the man, who was called Adami, saw a beautiful land at a distance across the waters. He told the woman of it and desired her to go with him to the new country. The woman advised him to let well enough alone, and thought they had better stay where they were. But the man insisted and finally he carried her over on his back, having found a very narrow isthmus, connecting the new land with the

island. The moment they reached the new country the isthmus sank behind them and they were left cut off from their home, and what was their disappointment when they found the country to be only barren rocks and sand, and Brahma cursed them for their disobedience. But Adami said, "It was my fault; curse me, and not her." Brahma said, "I will save her but not you." Here the woman replied, "I love him. I cannot live without him. If you will not spare him do not spare me," Brahma replied, "I will spare you both and watch over you."

ACCORDING TO THE NORTHMEN.

According to the mythology of the Northmen, or the ancient inhabitants of Germany, Norway, Sweden and Denmark, in the beginning there was a great empty space on the north of which lay a region of mist, ice and snow, and on the south a region of sunlight and warmth. The breath of the South swept across to the ice and snow, causing it to melt and fall into the empty space between. Out of this sprang a giant who fed on the milk of a cow. The cow lived by licking the ice. Finally she licked until there appeared three beings who killed the giant, and out of his flesh made the earth, out of his bones the mountains, out of his blood the sea, and from his hair they formed the trees, from his teeth the rocks and crags, from his skull the heavens, and from his brains the clouds. They then created a man out of an ash tree and a woman out of an alder, and from this pair the human race originated.

THE CHINESE MYTH.

The Chinese myth has it that in the beginning all was darkness and confusion, but out of a vast egg came a be-

ing called Poon-koo-wong. The lower half of the shell of the egg became the earth, and the upper half the heavens. With his right hand he created the sun, and with his left, the moon and stars he made also. Then he created the five elements, earth, water, fire, metal and wood. He then caused a cloud of vapor to rise from a piece of gold, and a similar cloud from a piece of wood. He breathed on each cloud, and the one from the gold became a male principle, and the one from the wood a female principle. The result of the union of the two clouds was a son and daughter, and these two beings were the parents of the human race.

AMERICAN AND OTHER MYTHS.

Almost every Indian tribe of the Western Continent has its own peculiar myth concerning the origin of man, Many of the South American Indians, and most of the Western tribes represent their ancestors as having come from caves, lakes or springs, hence they have a peculiar veneration for these places. The nations of the neighborhood of Lake Titicaca, claim to have descended from ancestors who came from this lake. The Waraus, a tribe of Guiana, say that their ancestors originally lived in a country above the sky. One day a young hunter in searching for his arrow, found a hole which led down to the world below. Prompted by curiosity he made a ladder of rattan and descended to our earth. Here he found many strange animals whose flesh he relished very much. After a time he thought he would like to return to the sky and tell his people of his discovery. With great difficulty he succeeded in climbing back. His friends were anxious to visit the new country, and began to descend through the aperture. They all got down safely except the last man, who, being very fat, stuck fast in the hole

and remained there, shutting off all communication thereafter between the two worlds.

The Kumis, a tribe of Asia, believe that a certain god after having made the world, set to work to make one man and one woman of clay, but as he worked only in the daytime, a great snake came at night while he slept and devoured the two beings. Finally he created a dog which drove off the snake, and the creation of man was completed.

The negroes in Guinea believed that man was created by a huge black spider.

Burchell inquired of a tribe of Kaffirs concerning their ideas of creation, and received for reply the assertion that "everything made itself, and that trees and herb-
age grew by their own will."

The Peruvians have a tradition that after the flood six people came out of a cave and re-peopled the desolate earth. Certain native tribes of Texas claim originally to have come from the Hot Springs, Arkansas. The Appalachian tribes say they had their origin from an artificial mound on the Big Black River. The Damara tribe of Western Africa, believe that they had their origin along with all the animals in a certain tree that grows in their country. They say that when they came from the tree all was dark, and a man lighted a fire which scared away the most of the animals. These became the wild animals; the few that were left becoming the tame or domestic animals. De Smet, the Jesuit missionary, relates the following tradition of the Blackfeet Indians: "There were two lakes—the lake of the men and the lake of the women. The men came from the former and the women from the latter. On first meeting the men struck up a bargain with the women in which the latter were outwitted and reduced to a state of perpetual drudgery, The

bargain was this : The men agreed to be the protectors of the women if they would do all the household work."

The Ute Indians believe that the earth was at first covered with a mist which the Great Spirit scattered with his bow and arrow. Finding the earth uninhabited he made a man out of clay, and set him to bake. It was his first attempt, and the fire not being hot enough, the man came out white. Then he tried a second time and got the fire too hot, and the man came out black. The next time he succeeded in getting the fire properly tempered, and the man came out red—the most perfect type of humanity.

The Tonkaways of Texas, trace their parentage to a mole. The Delawares claim to have descended from a snail ; and the Choctaws from the crawfish.

The Abipones, a people of South America, believed that they descended from the pleiades, or "seven stars," which they called their Great Father. This constellation disappears from the sky of South America during part of the year, and then these people think their Great Father is sick, and fear he is going to die. When the stars again become visible they celebrate his recovery with festivities and music.

The Calmucks believe that the first inhabitants of earth were divine and lived 80,000 years, that they had wings and luminous faces, and could live without food. But there was a fruit called "shime," which was sweet and tempting, and men began to taste of it, but alas, it deprived them of all their perfection, their wings fell off and the brilliancy of their faces disappeared. They felt the need of food and their lives extended only to 10,000 years.

The Seminole Indians, it is said, have the following tradition of the origin of men : When the supreme being made the earth, he made three men who were of a fair

complexion. He then led them to a small lake and ordered them to jump in and wash themselves. One sprang in immediately, and came out whiter than ever. This was the White Man. The second hesitated, and in the meantime the water became somewhat turbid from the agitation of the first, and when he came out of his bath he was copper-colored. This was the Indian. The third, staying out of the water too long, it was very dark with mud, and he came out black. This was the Negro. The Supreme Being now placed before the men three boxes, and because the black man had been unfortunate, gave him first choice. He chose the heaviest. The Indian chose the next heaviest, and the white man was obliged to take the lightest. The boxes were now opened, and the first was found to contain hoes, axes and other implements of labor. The second box contained bows and arrows and other hunting and fishing apparatus, and the third contained pens, ink and paper, and thus were the several occupations of these three races determined.

The inhabitants of Madagascar have a very curious myth concerning the origin of the race. The first man, they say, was made of dust and placed in a garden where he was surrounded by luscious fruits and clear streams, but had no desire to eat nor to drink, and was free from disease of any kind. The Creator had forbidden him to eat or drink, but the great enemy came and attempted to persuade him to partake, picturing to him in glowing colors the deliciousness of the fruits of the garden. Failing in that, the enemy changed himself into another form, and pretending to be a messenger from the Creator, commanded him to eat and drink. The man obeyed the command and very soon there appeared on his leg a pimple which gradually enlarged until at the end of six months it burst and a beautiful girl issued from the tumor. The man

was at a loss to know what to do, but a messenger from heaven appearing to him, told him to let her remain in the Garden until she had grown up and then take her for his wife. This woman became the mother of all human beings.

The Popul-Vuh, or sacred book of the Quiches, a tribe of Central America, gives an account of creation somewhat as follows: There was a time when the earth did not exist, only heaven, below which all was empty space. A vast expanse of water first appeared. The earth rose out of the waters. Then the gods created animals, but were disappointed with them because they could not tell their names, nor worship the "Heart of Heaven." Then it was resolved to create man. Four attempts were made before the gods were successful. First they made man out of clay, but he had no mind, and the water dissolved him. Next they were made of wood and they increased in numbers but had not intellect, and could not worship, so they withered away. The third time man was made of a certain tree and woman of the pith of a reed. These could neither think, speak nor worship and they were destroyed with a flood, except a few who escaped by climbing tall trees and exist to-day as monkeys. The fourth attempt was successful. Four men were created who could reason, speak, and had powerful intellects. They worshiped the Creator, but the gods were frightened at their knowing so much and breathed clouds into their eyes so that they would be men and not gods. Then, while they slept, the gods made them four wives. From these came all the people of the earth.

S. Baring-Gould gives the following tradition of the Kickapoos, a tribe of American Indians: There was a time when there were no women, and the men were not like those of the present, for they had long, bushy tails

of which they were very proud. They plaited the long, silky hair and decorated them with beads, shells and ribbons. They neglected the worship of the Creator and the latter resolved to punish them by depriving them of their favorite appendages. This deprivation caused such a sorrow among them that the Creator as a compensation took the tails and converted them into women upon whom the men now bestowed their admiration, and decorated them as they had done the tails. Woman, they say, still retains indications of her origin, for she is still beloved by man, is beautiful, with flowing hair, lively and frisky, and ever follows after man as did the tails of old, but instead of brushing off the worrying insects as did the tails, she is provided with a sharp sting, which is called a tongue, to worry him.

The Talmud, or Hebrew book of laws and traditions, has some very absurd notions in regard to Adam, the progenitor of mankind. He is said to have been made out of dust collected from every part of the earth and so tall that his head reached heaven, while his face was brighter than the sun. He was feared by the angels and worshiped by all creatures. The Lord, to display his power to the angels, caused a deep sleep to fall on Adam and then removed a portion of every member of his body so that while he was reduced in size he retained his proportions. The portions removed were distributed to every part of the earth. Lilith, the mother of demons, was his first wife, but she flew away and left him. Then Eve was created from one of his ribs. She was brought to Adam in a beautiful dress and accompanied by a choir of angels playing on heavenly instruments. Delicious food was served on tables of precious stones for the wedding feast, and the sun, moon and stars danced together at the wedding. The angels were jealous of Adam's glory and one of them,

Sammel, succeeded in seducing him and causing his fall.

On the island of Ceylon there is a mountain over 7,000 feet in height, known to-day as Adam's Peak. It was so named by Europeans after the Arabian name. The Arabs have a legend which relates, that Adam after his expulsion from Paradise was compelled to stand on one foot upon this mountain a thousand years, until God forgave him. There is on the top of this mountain a depression resembling a human foot about five feet long by two feet wide. The natives have surrounded this depression with a rim of brass set with precious stones, and erected over it a canopy of wood regarding it as the footprint of Buddha, the founder of Buddhism. Mohammedans regard it as the footprint made by Adam during his thousand years of penance, and the Hindoos as that of their God Siva.

The natives of Patagonia believe that men were created by certain gods who inhabit vast caverns under the earth. The deities created the Indians in these caves and gave them bows and arrows, and turned them out to shift for themselves as best they could. They believe that the Spaniards were created by other deities who gave them guns and swords.

The Ainos are a tribe living in Japan, but distinct from the Japanese. They are noted for the abundance of hair on their bodies, and the Japanese have a legend that in ancient times the mothers of this tribe suckled young bears which in time developed into men.



CHAPTER II.

SCIENTIFIC THEORIES OF MAN'S ORIGIN.

Life sleeps in the mineral, dreams in the flower, wakes in man.
—*Leibnitz.*

SPONTANEOUS GENERATION.

While it is true that many of the ancient philosophers had a sort of vague idea that all life sprang from dead matter, it is only of comparatively late years that the doctrine of spontaneous generation has been held by men of science. Two hundred years ago it was a common notion that the maggots that make their appearance in a piece of decaying meat were spontaneously produced, but Reid, an Italian naturalist, tried the experiment of simply covering the meat with a piece of gauze which would admit the air but exclude the flies. The result was that no maggots made their appearance.

Then the doctrine, that "all life comes from an egg," began to take a definite form. But the doctrine of spontaneous generation, or abiogenesis (these terms meaning the production of life from dead matter), began later to be advocated by men of science. Many attempts were made to prove it by experiments. They took certain substances containing the chemical elements necessary to form the matter of a living organism, and having taken the proper steps to destroy all eggs or living forms which it might already contain, and excluding all which might enter

it from the atmosphere, they laid the vessel away for a time and then examined the contents with the microscope with the hope of finding living organisms. Some experimenters after having, as they claimed, taken all possible precautions, thought they found manifestations of life. Dr. Charlton Bastian was one of the most enthusiastic advocates of this doctrine, but what he took to be living organisms, turned out, as claimed by his opponents, to be only minute particles of glass.

The majority of scientific men of high standing do not hold to the doctrine of spontaneous generation to-day. Professors Huxley and Tyndall, who stand very high as careful and honest investigators, do not admit it, yet they hold themselves open to conviction upon the discovery of further evidence. We can then say that it has not been shown by experiment or by reasoning from any known facts that all life did not come from pre-existing life.

THE ORIGIN OF SPECIES.

So much as to the origin of life. But as to the origin of the various species of animals, man included, there has been much scientific research and discussion of late years, and much might be said here in regard to the views of eminent scientists, but our limits will permit only a cursory glance at the history of the literature on this subject, and a brief statement of some of the theories which have been advanced.

Before proceeding further it may be well to define what is meant by the term species. Naturalists designate by this term all animals or plants which have descended from a common parent, and have a close resemblance in essential points. Thus, the cow is one species, and the horse another species. The offspring of the cow is a cow, and the offspring of the horse is a horse, and so on.

Now it is a fact that, although the offspring generally resembles the parent very closely, yet there are differences or variations as they are called, and in the course of a number of generations the animals may differ considerably from the original parents. This tendency to vary is more marked among some species than among others. When the variation becomes marked and fixed so that it is transmitted to offspring, we have a permanent variety. By selecting and breeding only from those individuals having the proper marks, breeders of domestic animals may produce artificially permanent varieties in the course of a number of generations. In this way the great breeds of cattle, horses, and dogs have been produced. Varieties do not differ from each other so much as species. The offspring of a cross between two different species is called a hybrid. Hybrids are nearly always sterile. The crosses between varieties are called mongrels, and are always fertile. Bearing these facts in mind the remarks on the development of species will be better understood.

VIEWS OF LAMARCK.

With the exception of some vague hints in the writings of Lucretius, and some other ancient authors, the first attempt at a discussion of the subject of development or evolution of species, was made by Lamarck, an eminent French naturalist, in 1809. He admitted the existence of a God who created matter, its properties, and the forces which act upon it; but contended that life and all organisms are a product of matter. He held that the highest forms of animal life were produced by a long-continued process of development from the lowest forms. His principles are summed up in the following propositions: 1—That any considerable and permanent change in the circumstances in which a race of animals is placed,

superinduces in them a real change in their wants and requirements. 2—That this change in their wants necessitates new actions on their part to satisfy those wants, and that finally, new habits are thus engendered. 3—That these new actions and habits necessitate a greater and more frequent use of particular organs already existing, which thus become strengthened and improved; or the development of new organs when new wants require them, or the neglect of the use of the old organs, which may thus gradually decrease, and finally disappear.

To illustrate this theory he would suppose the long neck of the giraffe to have been produced from a shorter-necked animal by the conditions of a scarcity of food on the ground, rendering it necessary for the creature to secure its subsistence by reaching up higher and higher on the trees, strengthening and improving this part of the animal.

These principles were considered as wild speculations at the time, and did not receive much attention until within, perhaps, the last twenty-five years. About the year 1844 a work appeared anonymously with the title, "Vestiges of Creation," in which the author upholds, in the main, the doctrines of Lamarck. He points out the gradations existing in the animal and vegetable kingdoms and the close resemblance at different stages of growth of animals in embryo, or the condition previous to birth. He lays stress on the fact that the human embryo in its stages of growth resembles successively the reptile, the fish, the bird, and the man.

Previous to the appearance of the "Vestiges of Creation," Saint Hilaire, a distinguished French naturalist, advocated the doctrines of Lamarck in discussions with Cuvier, who opposed them. The great German poet, Goethe, also advocated the theory of development, and

the eminent English geologist, Sir Charles Lyell, lent his influence to it in his work, "Principles of Geology." Naturalists generally opposed the doctrine until some time after the advent of the great work of Charles Darwin, which appeared in 1859.

DARWIN'S WORK.

The theory of Darwin has had a very strong hold upon the public mind, and especially upon those who have made a study of the subject, and it has also met with violent opposition, both among men of science and theologians. It is but justice to say here, although the doctrine of Development, or Evolution, as it is now known, did not originate altogether with Darwin, inasmuch as his theory is the same as Lamarck's in this respect, that he accounts for the origin of all species of animals and plants by gradual workings of natural causes.

Though in the main agreeing with his predecessors, Darwin differs greatly from them in the details of his theory. Another naturalist, Alfred Russell Wallace, however, at the same time, unbeknown to Mr. Darwin, originated the doctrine of natural selection, which is the special feature of Darwin's theory, although he [Wallace] denies its applicability to the origin of man.

The father and grandfather of Darwin were physicians, the latter noted as a naturalist, physiologist, and poet. Darwin himself being possessed of a sufficient fortune to make him independent of labor for subsistence, devoted his whole time to the study of natural history. As a naturalist he has never been excelled, and as Dr. Hodge, one of his strong opponents, observes, "He is on all sides respected, not only for his knowledge and his skill in observation and description, but for his frankness and fairness."

His great work, "The Origin of Species by Means of Natural Selection, or the Preservation of Favored Races in the Struggle for Life," appeared after twenty years of study and research. In this work he makes no particular allusion to the origin of man, but in a work, entitled "Descent of Man," which appeared later, he applies the doctrine particularly to the origin of the human species.

His theory is based upon the following principles :

1. The law of hereditary descent, or like begets like. According to this law the offspring in all essential points resembles the parent. This tends to preserve a variety or species when once formed.

2. The law of variation, by virtue of which the offspring, although resembling the parent in essential particulars, tends to vary, or differ more or less from the parent. These variations are sometimes advantageous to the offspring and enable it to sustain itself in the "struggle for existence." This law tends to form new varieties which may in time become species.

3. The law of increase in geometrical ratio, creating a tendency to outstrip the means of subsistence, thus giving rise to a "struggle for existence."

4. The "survival of the fittest," that is the individuals which by virtue of accidental variations which favor them or give them the advantage over other individuals in the struggle for existence, will survive and be able to transmit these variations to their offspring, according to hereditary descent.

Thus, as the stockbreeder selects certain individuals, having certain variations and breeds from these individuals alone, allowing the rest to die without progeny, *Nature*, a stockbreeder on a large scale, makes her selection by the necessities of the surrounding circumstances.

This doctrine is known as natural selection. The doctrine of sexual selection is also dwelt upon. Members of each sex have certain preferences among the members of the opposite sex in mating. Those individuals which are more highly colored or have greater ornamental appendages have the advantage in getting mated. Sometimes the superior strength of one individual over another of the same sex determines the mating. In this way selections are made, and the "survival of the fittest" maintained.

By the continual operation of these laws, Darwin thinks that during long periods of time all the various animals and plants may have been evolved or produced from a few or even a single original germ. He does not account for the original germs. He admits the existence of a God who created the original form, or forms, out of which the others have been evolved by the working of laws which He has created. Darwin does not hesitate to mention all facts which have a real or apparent opposition to his theory.

The common deduction from his theory, that men are the descendants of monkeys, is hardly a fair one. Darwin does not claim that a monkey was ever changed into a man, but that the remote ancestors of the monkey and the remote ancestors of man were the same, that is, that they diverged from a common stock, just as the varieties of apples have diverged from the common wild or crab apple. As before stated, many of the believers of the Bible accept this doctrine. They do not consider it incompatible with its teachings when rightly interpreted. Among the number are some eminent divines of the present day. Many scientific men accept it as a whole, and many others believe it with certain modifications, while others still reject it entirely.

OTHER MEN OF SCIENCE AND OTHER VIEWS.

Agassiz, one of the greatest of naturalists, while admitting the progress of life from the lowest to the highest, held that each species was created by direct interposition of the Creator, who from time to time, introduced higher forms, until man, the crowning work of all, was reached.

Mivart, an eminent British naturalist, differs from Darwin in that, instead of minute variations, there may have been great and sudden changes which tended to produce new species.

Prof. Dana, the distinguished American geologist, while admitting that "the evolution of the system of life went forward through the deviation of species from species according to natural methods not yet clearly understood, and with few occasions for supernatural intervention," says further, "for the development of man, gifted with reason and will, and thus made a power above nature, there was, as Wallace has urged, the special act of a Being above Nature whose supreme will is not only the source of natural law, but the working force of nature herself."

Prof. Asa Gray, the well known botanist, is a strong believer in Darwinism. He said, as quoted by Andrews in his text-book of Geology, "Let us hope that the religious faith which survived without a shock the notion of the fixity of the earth, may equally outlast the notion of the absolute fixity of the species which inhabit it, that in the future, even more than in the past, faith in an order, which is the basis of science, will not—as it can not reasonably—be dissevered from faith in an *ordainer* which is the basis of religion."

Further on this point Darwin himself says, in his "Descent of Man," I am aware that the conclusions arrived at in this work will be denounced by some as highly irre-

ligious; but he who denounces them is bound to show why it is more irreligious to explain the origin of man as a distinct species by descent from some lower form, through the laws of variation and natural selection, than to explain the birth of the individual through the laws of ordinary reproduction. The birth of both the species and of the individual are equally parts of that grand sequence of events, which our minds refuse to accept as the result of blind chance. The understanding revolts at such a conclusion, whether or not we are able to believe that every slight variation of structure—the union of each pair in marriage—the dissemination of each seed,—and other such events, have all been ordained for some special purpose.”

De Quatrefages, an eminent French naturalist, attacks Darwinism from purely scientific grounds, though he says: “There are some points in Darwinism which are perfectly unassailable. We may consider as the most important the *struggle for existence, and selection* which is the result of it.”

Benj. G. Ferris has, in a work just issued, promulgated a new theory of the origin of species, including man. He says: “My theory, in short, is, that at each step in the creation of species, a prior living organism is used by the Creator as an ovum or matrix to produce a new species, without the aid of the ordinary *paternity* required in reproduction; and precisely in the same way that the lowest animal was produced by creative influx into a matrix of crude earthy materials.” * * *

* * * “Now let us suppose human children to be born of ape mothers by the direct inflow of life from the Creator, they would find protection during infancy in the maternal affection and sympathy. They would inherit in the lower region of the mind the rudimentary qualities

and faculties common to the ape ; and as the higher and strictly human faculties derived from the Creator became developed, they would become not only gradually emancipated, but in the end obtain the mastery and control over their animal parentage."

Vaudin, a distinguished botanist, has promulgated a new theory of man's origin, which differs very much from that of Darwin, and which he attempts to reconcile with the Bible. His idea is that man originated from a peculiar incomplete form which was without sex, and somewhat assimilated in nature to that of the caterpillar as it is changing to a butterfly. This larva state was the "deep sleep" that fell upon Adam, and during which the force was at work which evolved the perfect Adam and Eve. The limits of this volume will not permit further explanations of this and other theories of scientific men.

In concluding this chapter it may be said that whether we know our origin or not, it is not essential to our present or future happiness. We are here, that we know. We have rights and duties, These are laid down in the Bible, in language plain and unmistakable as well as indicated in our own natures and the necessities of our social condition. Let us, then, do what we believe to be right, find out the cause of things if we can, but not relax our duties to ourselves and to our fellow men none the less if we can not.

The attempt to solve unsolvable problems, and, perhaps, this mystery of man's origin is one of them, always results in good, because the intellect is strengthened by the exercise, and often important discoveries are made in these channels and knowledge obtained which is of vast importance to mankind. Thus the vain attempts of earlier chemists to discover the "Philosopher's Stone," which they thought would turn everything into gold, resulted in

the discovery of many new substances which were of great value to men. The discussions of these scientific theories of man's origin have developed, no doubt, many naturalists, and important discoveries in natural history have been the result, to say nothing of the general wakening up of thought among the great masses of readers. Anything which will rouse the minds of the people and lead them to scientific subjects is in that sense commendable.



CHAPTER III.

SCRIPTURE DOCTRINES OF THE ORIGIN OF MAN.

“So God created man in his own image, in the image of God created he him; male and female created he them.”

—*Genesis I: 27.*

It is my purpose in this volume to state *facts* in regard to man as a physical, mental and moral being, and I do not desire to enter into any discussion upon questions which have not been settled by the mass of intelligent inquirers after truth. Therefore wherever there may be an honest difference of opinion upon any subject treated in the following pages, I shall not intrude my own views, which would have but little weight on any side, but shall give in a condensed form the opinions of men eminent in their respective departments of thought. These opinions of themselves constitute a species of knowledge which every well-informed person should possess.

According to the generally accepted interpretation of the Christian Bible, mankind originated in a single pair of individuals who were created about 6,000 years ago, in a state of absolute perfection. There are many men, in every sense orthodox Christians, and their numbers seem to be increasing, who have placed a somewhat different interpretation upon the book of Genesis, and while they do not deny the authority and infallibility of the Bible, claim that modern science throws light upon the

Scriptures, and that they should be interpreted in the light of this knowledge. There is also a large number of the school of liberal Christians, who accept the written theories of science in regard to the origin of man, and claim that these theories are not opposed to a proper interpretation of the Bible,

If the Bible be true there should be no conflict between its teachings and science, because science is truth. There are some who say we should not put too literal an interpretation upon Biblical statements; but that the aim and object of the Bible is to teach moral truth, and that it is not a textbook on science. There is no doubt that many of the statements of the Bible are highly figurative. Again much has been supposed to be taught by the Bible which can not be found within its lids. For example, no statement is made of the time of creation. We have certain figures given, but they are but inferences and not dates fixed by Scripture record. Neither have we anything definite as to the mode of creation. "In the beginning God created the heavens and the earth," is a broad statement. The passage which says: "The Lord God formed man out of the dust of the ground and breathed into his nostrils the breath of life, and man became a living soul," if we consider it in a figurative sense, which is plainly implied, does not conflict with any of the theories of science. Surely, we are not to imagine the Creator taking up a handful of dust and fashioning a man as a sculptor would a clay image, nor that he actually blew his breath into the man's nostrils. This language is altogether figurative. The use of the word breath for life is very common, and it is a very striking figure, for the physiologist tells us that the moment respiration stops, life departs. The figure of the dust points to the nature of the matter which composes the human body. The material

which forms our bodies to-day will, after death, return to its original inorganic condition, "to the dust from whence it came." Even the advocates of spontaneous generation can not find a contradiction in this passage. Again, the passage which tells us that woman was made from the rib of man, when considered in a figurative sense, is plain and striking, for it evidently points to the close resemblance physically between the sexes and their common origin. They are indeed "bone of one bone, and flesh of one flesh."

Dr. Hodge, in his work on Systematic Theology, however, says that "man's body was formed by the immediate intervention of God; it did not grow, nor was it produced by any process of development." He calls this Scripture doctrine, and all other explanations of man's origin he designates as anti-scripture doctrines.

Prof. Winchell, in his recent volume, entitled "Pre-adamites," devotes much space to proving that Adam was not the father of all mankind; but simply the founder of the Hebrew, or Jewish race. In his argument, he brings in not only science and history to establish his point, but the Bible statements themselves. He says: "I think the chief significance of Adam consists in his being the remotest progenitor to whom the Hebrews were able to retrace their lineage. The remotest ancestor to them known was to them the first man. I conceive human society therefore, on Biblical evidences, to have presented at the advent of Adam an advanced humanity, and a settled and populous condition."

The Bible says that Cain went away from home, married, and built a city. Whom did he marry, and where did he get the people to make a city? Winchell answers these and similar questions by the assumption that there were other people beside Adam and Eve and their progeny in existence at that time.

The doctrine of "Pre-Adamites" is not a new one. Prof. Winchell gives a chapter on the literature of this doctrine. It was first advanced by Peyrerius, a French ecclesiastic, in a work entitled "*Pre-Adamites, or a Treatise on the Twelfth, Thirteenth and Fourteenth Verses of the Fifth Chapter of the Epistle of Saint Paul to the Romans, from which it is concluded that the first Men existed before Adam,*" and published in Paris in 1655. The doctrine was universally denounced as heretical by the church, at the time, and was held in dis-esteem until within a quite recent period. Bory de Saint Vincent, a French traveler and naturalist, who died in 1846, maintained this doctrine; and since his time, it has had some very able advocates.

Winchell holds to the opinion, that these Pre-Adamites were very low in the scale of civilization, but says: "To assert that man has advanced from the lowest human condition, is not to assert that this condition was reached by advance from the brute. It is not necessary to assert this; and I wish the reader to note distinctly that none of the conclusions of this work rest on the assumption of man's derivation from a brute ancestor. Man may or may not have had such an origin; I do not trouble myself or the reader with that question."

To sum up all that can be said under the caption of this chapter, the Bible does not state the time, mode, or circumstances connected with the creation of man. We have the plain and simple statement that God created man in his own image, that is, he endowed him with God-like faculties; he created him from the dust of the earth and breathed into his nostrils the breath of life, which is as much as to say that his body was composed of the same material that forms our earth, but he was endowed with a life principle which none but God can give; male and female

created he them, that is, the human race was created with the power of propagating and continuing itself.

A few words in regard to the religious aspects of the scientific doctrines of creation. Darwin and his co-workers and followers have been denounced as enemies of the Christian religion, but this tendency is rapidly dying out ; the opposition from the side of the pulpit and the religious press is daily growing less. There are many men whose religious faith is undoubted, who are accepting the new theories.

Why should such views of creation seem irreverent or detract from a grand conception of the power of an almighty Creator? Have they not a tendency to enlarge our view of creation? These views are simply that an omnipotent Creator has established laws, and these laws have been at work through countless ages, producing all the immense variety of animate and inanimate forms, and the conclusion must be that they will continue to work out yet grander and nobler results. It is a grand idea to think that man originated from an humble condition and will continue to progress without limitation, yet never attaining perfection, never equaling his Maker, finding God always the ideal ahead and above him, and whom he may worship with meekness and reverence as a being, omnipotent, omnipresent and eternal.

It has been said that an undevout astronomer is mad. It may be more truly said that an undevout naturalist is mad. Finally, let me quote a few lines from one of our greatest astronomers, whose faith in an all-wise Creator is certainly undoubted. I refer to Richard A. Proctor. In an article on Newton and Darwin, he says :

“ I do not know whether the grandeur of the universe, as pictured by Newtonian astronomy, or the vastness of past and future time, as pictured by the Darwinian sys-

tem, is the more impressive. Certainly there can be imagined nothing much more wonderful than those vast depths of space in which we are absolutely compelled to believe, since Newton established the great law which bears his name. But if there is aught grander than this, aught more solemn in its impressiveness, it is the thought of the immeasurable vistas of past time, during which the races inhabiting the earth came into being under the action of laws assigned them; the still vaster time intervals belonging to the generation of system of worlds; the periods so vast that we can not regard them otherwise than as infinite, during which not solar systems, but whole galaxies of such systems, and systems of such galaxies—nay, higher and higher orders of such systems, absolutely without end, as without beginning—came into existence.

“That this widening of our conceptions of time as of space, and thence the widening of our ideas as to the domain of law, and consequently the recognition of the infinitely perfect nature of the laws of the universe (for only excellent laws can work for long, and only perfect laws can work forever), should have been regarded as antagonistic to religion in its wider and nobler sense, can only be regarded as resulting from the blindness, or the perversity, or the wrong-headedness of the ignorant.”



CHAPTER IV.

THE ANTIQUITY OF MAN.

Some writers have assured us that, in the language of Palgrave, "We must give it up—that speechless past; whether fact or chronology, doctrine or mythology; whether in Europe, Asia, Africa, or America; at Thebes or Palenque, on Lycian Shore or Salisbury Plain: lost is lost; gone is gone forever." Others have taken a more hopeful view, but in attempting to reconstruct a theory of the past, they have too often allowed imagination to usurp the place of research, and have written in the spirit of the novelist, rather than in that of the philosopher.

—*Sir John Lubbock.*

Although we have nothing which even approximates positive knowledge as to the time man has existed on the earth, it is very interesting to notice the opinions of men who have made a study of the evidences of his antiquity.

The eminent French writer, Louis Figuier, says: "It was thought that the Old Testament stated that man was created 6,000 years ago. Now the fact is, nothing of the kind can be found in the Book of Genesis. It is only the commentators and the compilers of chronological systems who have put forward this date as that of the first appearance of the race."

"The extreme uncertainty," says Dr. Hodge, "attending all attempts to determine the chronology of the Bible, is sufficiently evinced by the fact that one hundred and eighty different calculations have been made by Jew-

ish and Christian authors, of the length of the period between Adam and Christ. The longest of these make it 6,984, and the shortest 3,483 years." The chronology made out by James Usher, Archbishop of the Irish Protestant church, has been the most generally received. James Usher (born 1580,) was one of the most learned men of the church in his day. According to his calculations, the time between Adam and Christ was 4,004 years.

On the theory that Adam was not the first man, but only the progenitor of the Hebrew race, there is nothing in the way of admitting that man existed thousands of years before the time which has been fixed upon as the date of creation. As hinted in the last chapter, this doctrine of Pre-Adamites is held by orthodox men, and shown by them to be favored rather than contradicted by the Biblical account.

Dr. Hodge, who represents the strictly orthodox side of the question, makes this statement: "If the facts of science, or of history, should ultimately make it necessary to admit that eight or ten thousand years have elapsed since the creation of man, there is nothing in the Bible in the way of such concession. The Scriptures do not teach us how long men have existed on the earth."

The following is from a recent work entitled, "Man Before Metals:" "One of the most learned men of the present century, and at the same time a sincere Christian, Sylvester de Lacy, used to say, 'People perplex their minds about Biblical chronology, and the discrepancy which exists between it and the discoveries of modern science. They are greatly in error, for there is no Biblical chronology.'"

The evidence furnished by scientific research, favors the opinion that man has existed on the earth much

longer than is indicated by any written records. Dates, of course, cannot be given. Dates exist only in history. The most ancient histories do not take us back very far. Beyond a period of about 776 years before Christ, the history of the Greeks merges into mythology, or into those legendary times when truth and fable were confounded. The Hindoo history goes back only 2,000 years, and the Chinese books reach back only 2,600 years before the Christian era. The Egyptians have the oldest authentic history. From inscriptions on their monuments the antiquarian makes the reigns of certain rulers to have been about 5,000 years before Christ. But the estimates given by some scientific men, based upon geological and other evidences, render these figures insignificant.

Alfred Russell Wallace says: "We can with tolerable certainty affirm that man must have inhabited the earth a thousand centuries ago; but we cannot assert that he positively did not exist, or that there is any good evidence against his having existed, for a period of ten thousand centuries."

Says Prof. John Fiske: "We have every reason to believe that the glacial period of the Pleistocene Age began 240,000 years ago, and came to an end 80,000 years ago. But at the beginning of this period, men were living in the valley of the Thames."

Prof. Joseph Le Conte, of the University of California, referring to the time man has existed, says: "It may be 100,000 years, or it may be only 10,000 years; but more probably the former than the latter."

Pottery has been found in the alluvium 30 feet below the base of the statue of King Rameses, in the valley of the Nile. This statue was found in 1854, with its base buried 9 feet, 4 inches below the surface, and it is known

to have been erected about 1,260 years before Christ. This alluvium had therefore accumulated at the rate of $3\frac{1}{2}$ inches per century. Calculating from these data, Mr. Horner concluded that the pottery in question had been buried at least 11,660 years before Christ.

These statements are based on geological evidence. Baron Bunsen, a distinguished German scholar and theologian, maintained in his work on Egypt, that upon evidence outside of geology, the human race had its beginning 20,000 years before Christ; and Baldwin, in his "Prehistoric Nations," says the time may have been even much longer. Rawlinson in his work, "The Origin of Nations," thinks that about 2,450 years before Christ, is as far back as we can place Egyptian civilization, and that contrary to the opinions of believers in progressive development, the civilized period required no antecedent barbarous or savage state.

The evidences outside of geology are mainly drawn from the fact that we find a high state of civilization in Egypt, existing several thousand years before Christ, as shown by inscriptions and monuments, by works of art, etc., and the conclusion is drawn that it must have taken many years to develop this civilization from a rude and barbarous condition. The opponents of the doctrine of a great antiquity claim that it is unnecessary to suppose a long period necessary to reach a civilized state.

There are many, however, who place no confidence in the geological evidence, and do not draw conclusions from the state of civilization indicated in the early history of Egypt and other ancient nations, and, therefore, are ready to stand by the chronologies which were formerly accepted.

It will be well for the reader to bear in mind that learned men are not entirely free from prejudice. When

a man adopts a theory to account for some important phenomena, and comes in contact with minds of equal capacity in discussion, he is very apt to attribute too much significance to any facts which may be on his side of the question. This may be said, even of men who are considered honest, candid, and devout investigators.

It has been said of Darwin that he would go round the world to gain a new fact or correct an error he had made; but even a man like Darwin (so strong is this tendency of human nature) might be biased in his judgment. A writer on metaphysics, speaking of this tendency, says: "In most cases, prejudices are opinions which, on some account, men are pleased with, independently of any conviction of their truth, and which, therefore, they are afraid to examine, lest they should find them false." This will, perhaps, account for the great degree of variation among the estimates made as to man's antiquity. Until comparatively recent years, the majority of scholars were prejudiced by the figures of Archbishop Usher, and looked upon any deviation from them in chronological estimates almost with feelings of horror. They were not pleased with anything which seemed to threaten the overthrow of the infallibility of the Bible, not thinking that possibly their interpretation of the sacred writings might be erroneous. Of late years, many scientific men especially have been prejudiced by the theories of development, which requires a great period of time to bring up the race to the condition of civilization, which the earliest history records. Thus we will find the believers in the theory of Development advocates of a great antiquity for man, and on the other hand, the opponents of this doctrine do not wish to admit a great antiquity, because it seems to conflict with what they believed to be based upon infallible evidence.

THE NEBULAR HYPOTHESIS.

Before entering into a discussion of the probable time man has existed on the earth, let us consider what light the sciences of astronomy and geology throw upon the question of the age of the earth itself. The theory of the formation of our globe, which is almost universally accepted by scientific men as well as theologians, is known as the "Nebular Hypothesis." According to this theory, which explains many facts known to astronomers and geologists, the earth and all the planets were once a part of an immense collection of gaseous matter called nebula (a cloud or mist), which was in an intensely heated state, and revolving on its axis. This body, according to the law of centrifugal force, threw off successively rings of gaseous matter, which receded from the remaining mass, and gradually assumed the shape of globes or spheres, which, while revolving on their own axis, moved around the central mass. These globes, thus thrown off, became the planets—the earth being one of them. The remaining mass was the sun. These spheres, some of them at least, threw off their rings, which, condensing into spherical masses, formed the moons. One planet, Saturn, as the telescope reveals, has a number of these rings still existing. Many other facts of astronomy go to substantiate this theory.

Most substances, it is well known, may be converted from the solid to the liquid, and from the liquid to the gaseous state by the application of heat. Some require more heat than others to change their condition. Water is a common example of a substance which will assume these three forms under a comparatively slight variation of temperature.

Returning to our theory, we can suppose that cooling

off these gaseous globes would change them to the liquid form, and further cooling would convert them into solid masses. It must be remembered, however, that this cooling was gradual, and that the surface would cool long before the interior. Now the evidence is pretty conclusive that our earth is a liquid mass of intensely heated material, surrounded by a shell of solid material. The three forms would exist, however, on the surface, as different substances and change to the solid form at different temperatures. It has never yet got cold enough to liquify air; and water is solid only at a low temperature, while iron and many other substances we regard as solids, are liquids at very high temperatures.

The sun is yet sufficiently hot to furnish heat for the earth, but the latter has cooled down on its surface sufficient to support vegetable and animal life. But how was the surface of the earth prepared for the abode of vegetable and animal life? By reasoning from known facts, we are able to trace out dimly at least, this strange history. The water, by reason of the great heat, would be at first all in the form of gas or vapor, and, being light, would rise and form clouds at a distance from the earth. Being on the outside it would cool first, and assuming the liquid form would fall to the heated mass below, and being converted into vapor again by contact with the heated matter, would reascend into clouds. But at each successive shower the mass below would become cooler, until finally the whole would be cooled enough to allow the water to remain as a vast ocean covering the earth. Now the shrinking of the cooling crust would cause parts of it to be elevated above the water. Here chemical force, and the wearing action of the water would dissolve and wash down solid material, which would be deposited in layers at the bottom of the ocean. Thus were the first rocks

formed. But the shrinking still going on would again elevate portions of the crust, and perhaps the rocks we find to-day are the final results of many such changes before the whole crust cooled to its present stable condition.

THE BEGINNINGS OF LIFE.

The rocks which from their position are known to be the oldest or first formed, contain no remains of life, either vegetable or animal, but those of a little later age contain the lowest forms of animal and vegetable life. It must be remembered that the vegetable and animal kingdoms are arranged in a progressive scale, advancing from the simple to the more and more complex forms. There are all grades of organization in plants, from the minute portions of matter which is composed of a single cell (the basis of all vegetable and animal structures), to the large tree with its variety of tissue in the form of leaves, branches, flowers, and fruit. There are likewise animals forming a gradation between the single mass of jelly-like substance, without sign of limbs or organs of any kind, and the complex and wonderfully developed human body. A study of the rocks forming the crust of the earth (a knowledge of the successive layers for a great depth may be had, as they are often found turned up on edge by the force acting from the interior), shows a similar progression of forms of organic life. The lowest forms are found in the oldest layers. Many of the lowest forms of life exist, however, to-day, and are found all the way along the series, but the addition of higher forms has been gradual and progressive.

It is highly probable that plants came into existence before animals, as they can exist in a higher temperature, and the food of animals is mainly vegetable. The lowest

forms of both animal and vegetable life can exist in much higher temperatures than the higher forms, so that it is probable that life existed while the waters of the globe were yet comparatively hot. The higher animals could not live in the earliest periods, because there is evidence that at one time the atmosphere was heavily loaded with carbonic acid gas, which, though forming the principal nourishment of vegetables, is destructive to the higher animals. Man, therefore, did not exist during this period, which is known as the age of coal plants.

The reader must know that the geologist has divided the time of geological history into periods which are more or less plainly marked out in the rocks themselves, and that each of these periods is characterized by the introduction of new and higher forms of life. It is also known that while many of the animals which existed in times past, as shown by their remains, exist to-day, there are thousands of species which are now extinct, and are known only by their fossil remains. Thus we have the various divisions of geological history characterized by peculiar animals and plants, and the record of the rocks, or the "great stone book of Nature," shows approximately, at least, when certain animals began to exist, and when they became extinct.

CHANGES IN THE EARTH'S CRUST.

The structure of the crust of the earth shows that it has been produced in its present form by a succession of changes similar to those which have occurred within the memory of man, and most of which are going on, even at this moment. For example, earthquakes and volcanic action have elevated large tracts of land and sunk others below the level of the sea. Volcanoes have thrown out material which have buried large cities, and covered large

tracts of country. But the operations of Nature are not generally so sudden as the eruption of a volcano, or the shock of an earthquake. There is evidence that the crust of the earth is constantly moving in some part. The coast of North America, from New Jersey to Labrador, is now

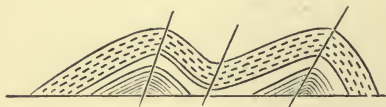


FIG. 1.—Cut illustrating the formation of mountains by long gradual rising of land.

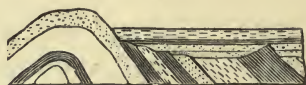


FIG. 2.—Cut illustrating how different Geological periods may be exposed by erosion of a fold.

slowly rising, while the southern part of Greenland is sinking. Norway and Sweden are rising in the northern part, and sinking in the southern part.

These changes are indeed slow, only a few feet in a hundred years. The accompanying cuts illustrate this rising and the subsequent wearing away of the rocks. A comparatively small area may thus show formations separated by immense periods of time.

The second figure illustrates how later formations may lie unconformable to the older.

The cause of these movements is evidently the slow contraction of the earth's crust consequent upon the cooling of the globe. But a series of more important changes are going on at the present time. To observe one of them we have only to notice a hillside during a hard rain. The soil is dissolved and washed down its sides, part of it being thoroughly intermingled with the water, is carried into small streams, and from thence to rivers, and even out into the sea. When we aggregate what all the little streams which form a large river are doing, we get some idea of the amount of material carried down. Measurements have been taken and estimates made in cases of large rivers,

and the results are simply astonishing. Thus the Mississippi River carries annually into the Gulf of Mexico 750,000,000 cubic feet of mud, which would be sufficient to cover a square mile 27 feet deep. The Ganges discharges annually nearly 400 million tons of material. Thus the general tendency of water is to level down and counteract the forces within the earth which have elevated the mountains and high lands. It has the effect, also, to groove out the comparatively level land by cutting deep ravines and canyons. This washing down of the elevations and depositions of the material in the ocean bed to form layers of rocks, has been going on for immense periods of time, as evidenced by their great thickness in many places. Many of the rocks thus formed by deposit in water have been subsequently elevated, as is proven by our finding remains of shell-fish and other sea animals upon mountain tops and other elevated regions. Indeed, so abundant are these evidences that in almost every section of the country specimens of these petrified marine forms may be found, either in the rocky layers or in the drifted gravel and sand.

Geology does not reckon time by years but by periods, or epochs. There is no way of knowing just how long any given layer of rocks was in forming, but sufficient is known to enable us to say that the earth has been a long time attaining its present condition. All admit now that the earth is a very old structure, millions of years, perhaps thousands of millions of years would not be a high estimate for its age.

ADVENT OF MAN.

But when did man, the crowning work of creation, make his appearance? Does he exist in a fossil state? What is a fossil? Literally it is anything dug up from the earth,

but the term is usually applied to the more or less perfectly petrified remains of plants or animals.

Cuvier, the great French naturalist, would not admit that man existed as fossil. But we are forced to admit to-day that man existed at the same time with those immense animals, the mammoth and the mastodon, which are now extinct. Stone hatchets and other stone implements have been found buried in connection with the bones of these animals. This alone would not be strong proof, because the implements and bones might have been commingled by convulsions of nature, such as earthquakes, but stronger evidence exists. The bones of men have been found in caves along with the bones of the mammoth, cave bear, cave hyena and other animals now extinct, also cinders and ashes which are supposed to indicate the traces of a funeral feast, such as characterized the early inhabitants of Europe in historic times. As a still better evidence, a piece of ivory was found, on which was rudely engraven a picture of one of these mammoths, or hairy elephants. This must have been drawn by a man who lived at the same time with this animal.

Dr. Koch discovered in Gasconade county, Mo., the remains of a mastodon under circumstances which leave little doubt that the animal had become mired in a swamp and then been killed by men. Around the bones were a number of pieces of rocks, just such as are to be found in a river near by. They had evidently been carried there and hurled at the animal, as the surrounding clay contained not even a pebble. Arrow heads and stone axes were also found among the bones. Many of the bones, especially those of the head, had been burned by fire and a layer of ashes surrounded the skeleton. This would indicate an attempt to destroy the huge creature by building fires against it.

In Louisiana basket work and matting were found two feet below the tusks and bones of a mastodon.

About the beginning of the present century there was discovered at the mouth of the river Lena in Siberia the entire carcass of a mammoth, the flesh and hair perfectly preserved in the ice. The tusks were cut off and sold for ivory, and the white bears, wolves and foxes ate up the flesh. Although this specimen was perfectly preserved, there is no evidence that it existed contemporary with

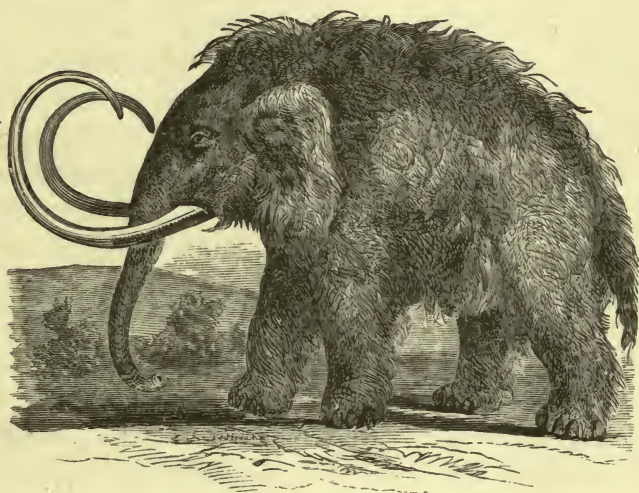


FIG. 3.—MAMMOTH, OR HAIRY ELEPHANT.

man, or that it was more recent than those whose bones are found in the ground, because a frozen animal, so long as it remains in that condition, would be preserved, and there is no way of knowing how long this animal may have been locked up in the ice. But it has served to give us a better idea of the form and structure of the animal, and it confirms the evidence of the picture found engraved on a slab of ivory, mentioned above.

There is now scarcely a doubt that man lived contem-

porary with the mammoth, mastodon, cave bear and many other animals which are now extinct, and known only by their fossil remains. But does this establish his great antiquity? No, unless we can prove that these animals have been extinct for a great length of time.

Of this we have no means of judging with any degree of accuracy. Petrified remains of animals will of course preserve for an indefinite period, and bones and other hard parts under certain circumstances are capable of being preserved for a very long time. But the softer parts would not be preserved very long.

It may be true as some have argued, that the finding the remains of these animals in connection with the remains of man proves, not the great antiquity of man, but that these animals have become extinct in comparatively recent times. A skeleton of a mastodon was found in Fountain county, Indiana, in the bones of which the marrow was so well preserved that the workmen used it to grease their boots, and masses two or three inches in diameter of a fat-like substance were found in the region of the kidneys of the animal. In another case traces of vegetable matter were found between the ribs, which was undoubtedly the contents of the stomach of the monster, and constituted his last meal.

Again, many animals are known to have become extinct within the historical period. The Dodo was a gigantic bird, which inhabited the islands of the Indian Ocean, but is now extinct. The Dutch sailors in the seventeenth century found them in great numbers, and it is said killed many of them for the stones found in their stomachs. It is highly probable that man was the chief agent in exterminating the mammoth and mastodon. There is, then, no weighty evidence of man's antiquity in the fact that he existed cotemporary with certain animals of which we have no history, save the silent one of their fossil remains.

The Miocene is one of the epochs of geologic history, the great age of which is admitted by all. The evidence as to the existence of man in this epoch, however, is extremely doubtful. Flakes of flint, which, from their appearance may have been shaped by the hand of man, and some bones of animals, with grooves or scratches, as though they had been *scraped*, were found. Some think that the flint flakes were the result of physical agencies, and the bones were scratched by currents of water and sand, or by the teeth of animals.

The next geologic epoch above the Miocene is the Pliocene. The evidences of man's existence in this epoch are also extremely doubtful. In a number of instances human bones and works of art have been reported as having been found in the rocks of this epoch, but none of them are well authenticated. Prof. J. D. Whitney described a skull which was reported to him to have been found at the depth of 130 feet in the gravel beneath a bed of lava in California. This gravel has been supposed to belong to the Pliocene epoch. Prof. Le Conte says there are three kinds of doubts in regard to this skull: 1. As to the truthfulness of the story of the skull having been found in that position. 2. As to this gravel belonging to the Pliocene epoch. 3. As to whether the gravel had not been disturbed after its deposit.

Bret Harte, in a poem entitled, "To the Pliocene Skull," ridicules the idea of finding remains of man so ancient. The skull he refers to in this poem is the one described by Prof. Whitney. The last stanza of the poem offers the poet's explanation of the locality of the skull. He makes the skull to speak and say:

"Which my name is Bowers, and my crust was busted
Falling down a shaft in Calaveras county,
But I'd take it kindly if you'd send the pieces
Home to old Missouri."

The epochs mentioned above are divisions of the Tertiary Period, and, as we have seen, the proof of man's existence in this period is not satisfactory. The next period above the Tertiary is the Quaternary. The evidences of man's existence in the middle of this period seem to be abundant. In this period have been found in many places human skulls and other bones ; flint implements and ornaments of various kinds associated with the bones of extinct animals.

DEVELOPMENT.

The believer in progressive development of man from the lower forms finds little consolation from a study of the most ancient skulls. One of the most ancient of these skulls was found at Engis, Belgium. Instead of being that of a half man, half monkey as to intelligence, it has been pronounced by good judges to be a "well-shaped average human skull." Another skull, famous for its evident antiquity, is known as the Neanderthal skull, having been found in a cave of that name in Europe. This skull has excited a great deal of interest among scientific men. It is very low in the arch, very thick and retreating in the forehead, and has been supposed to be a form intermediate between the ape and man ; but it is the opinion of some of the most eminent authorities, and among them Prof. Huxley, who leans to the side of development, that it is in no sense that of a lower form of animal. Its capacity is about equal to that of the average barbarian.

But does the fact that the remains of man are found in the middle of the Quaternary period indicate a great antiquity? We can only repeat that geology does not reckon time by years, but that the evidences are strong that the duration of this period was very great, that it required a *long time* to make the change necessary to produce the rocky strata of this period.

The skeletons taken from the works of the Mound Builders of the Mississippi Valley indicate a great antiquity. These skeletons are always found deep within the mounds, and generally in a state in which they crumble to dust when handled. Baldwin says: "Sound and well-preserved skeletons, known to be nearly two thousand years old, have been taken from burial places in England and other European countries less favorable for preserving them;" and he concludes that these skeletons of the Mound Builders are much more than two thousand years old.

Now, as we shall see further on, these people were highly civilized, and, as it must have taken a long time to have reached this condition, we could safely add two thousand years more to the time America has been occupied by man. But this only gives us four thousand years, not so long as the historical record shows us.

Says Edward B. Tylor: "The few thousand years of recorded history only take us back to a pre-historic period of untold length, during which took place the primary distribution of mankind over the earth, and the development of the great races, the formation of speech, and the settlement of the great families of language, and the growth of culture up to the level of the Old World nations of the East, the forerunners and founders of modern civilized life."

We must, then, give up the problem. We do not know how long man has existed. Need we care? We know man exists, and though it is a matter of interest to know when he began to exist as well as to know how he began to exist, it is not essential to a performance of our duty, nor to our ultimate happiness.

CHAPTER V.

LIFE OF PREHISTORIC MAN.

“Enough for me if I have succeeded in awakening within you a sense of the mighty past of the human race.”

—*Lazarus Geiger.*

What can we know of a people of whom we have no history in the form of books, and no traditions? Let us imagine a case. Suppose a large island should to-day rise out of the Atlantic Ocean. On investigation, suppose we were to find human bones, along with tools and ornaments. Would this be evidence that the island had once existed, was inhabited by man, and had sunk beneath the waves, to be again elevated? This would be our first thought, certainly. But a skeptical mind might say that the bones and implements might have come from vessels wrecked and sunken in the bosom of the ocean. But suppose these relics were to be found deeply buried beneath rocks and gravel, and in connection with them the bones of animals entirely different from the bones of animals now existing. This would strengthen the evidence yet it would not be conclusive, for the animals might have existed on the island before it sank beneath the ocean and the remains of man have been lost on the sea and covered deeply by the action of the waters.

This would not be a strong objection because the bot-

tom of deep water is known to be comparatively quiet. But imagine further that on this newly-risen island we should find works of art, or fine buildings, statues, drawings on stone or metal. Would not the degree of perfection of these works indicate the degree of their advancement in these arts? Suppose the implements were varied in kind, and perfect in formation. This would indicate a people advanced in manufacturing and agriculture. Each kind of implement would tell its own peculiar story. But



FIG. 4.—STONE ARROW HEADS FOUND IN NORTH AMERICA.

the pictures would tell us much more, for pictures may represent not only objects but actions. By them we might gain a knowledge of the, religion, government, social customs and disposition of the people.

Thus men may be judged by their works. Where works of art, well-constructed tools and machines, and fine buildings are found, may we not expect to find people advanced in intelligence? On the other hand, were only rude implements of stone or copper, with perhaps some

attempts at ornament in the shape of rude imitations of objects in stone or metal to be found, would we not infer that the people who inhabited the island were low in the scale of civilization?

POMPEII AND HERCULANEUM.

The history of the buried cities Pompeii and Herculaneum, is an illustration of the fact that knowledge may be lost and again restored. At the beginning of the Christian era Pompeii was a city of about 35,000 inhabitants, noted for its wealth and refinement. It was situated at the foot of Mt. Vesuvius near the mouth of a river, and on the shores of the Mediterranean Sea. Around it lay a fertile plain, and with its advantage for commerce it had become a great and powerful city. The inhabitants were pursuing their ordinary avocations. The rich were enjoying their luxuries, and the poor were toiling for bread, but suddenly old Vesuvius which had slumbered for centuries began to tremble and send forth ashes and stones which poured in an incessant shower upon the doomed city. At the same time great quantities of liquid mud rolled down its sides, and ran in a stream into the city. Many of the inhabitants escaped, but great numbers were caught and buried alive. The eruption continued until the whole city was completely buried to the depth of from 20 to 70 feet.

Thus in the short space of three days this mighty city had completely disappeared. Some vegetation grew and houses were built over its site, and in time its very name was forgotten by the people. Nearly 1800 years afterward, a peasant in digging discovered some bronze articles. Extensive excavations were then made and soon the principal part of the city was revealed to the antiquarian.

Over 300 buildings, including theaters, temples, schools, stores and factories, have been exposed. Tables and chairs, decorated with gold, ivory, pearls and precious stones, lamps of many patterns, sculptured marbles and decorated walls, were revealed in great numbers, indicating the wealth and refinement of the inhabitants. Beautiful



FIG. 5.—MOSAIC, POMPEII.

mosaics, or pictures made by inlaying fragments of stones or other hard materials, of different colors, were found. Fig. 5 represents a piece of mosaic work found in a house in Pompeii.

Some of the paintings on the walls were as fresh and vivid in color as if put on yesterday. The mud and ashes

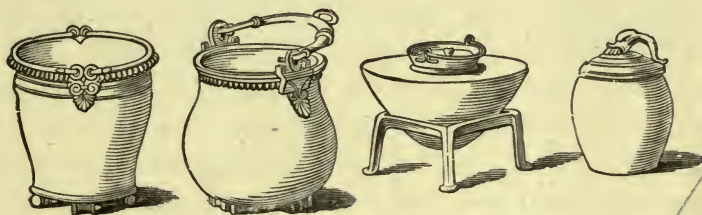


FIG. 6.—VESSELS, POMPEII.

had hardened around the articles, and had preserved every thing which high heat would not destroy. In one house was an oven with eighty loaves of bread burned to a coal, and great numbers of household articles and kitchen utensils were found everywhere.

Certain curiously shaped cavities were found, which,

containing human bones and remnants of clothing, suggested the idea of filling them with liquid plaster of Paris. When this was done and the plaster had set, and the mud was broken away, there came out perfect casts of human bodies. Following out this plan, the excavators succeeded in revealing a great many bodies in various positions. Some seemed to have been in the act of attempting to escape with their treasure.

TROY.

Troy, according to Homer and other Greek poets, was a mighty city, situated on a plain between mountains and hills, at the eastern extremity of the Ægean Sea. Homer, in his great poem, the Iliad, describes the Trojan war, and the siege of Troy by the Greeks. This was supposed to have taken place about 1,200 years before the Christian era.

Excavations recently made upon the supposed site of ancient Troy by Dr. Schliemann revealed evidence of the existence of seven distinct cities, which had been built each upon the ruins of its predecessor, the Troy described by Homer being the third from the bottom.

“Here were found (*) enormous wine-jars, spear-heads of copper, elaborately decorated vases, mystic whorls and figures of Pallas, and most important of all, numerous and costly necklaces, and diadems, and goblets of massive gold, to the number of thousands. These relics are quite independent of structures and sculptures of more recent ages discovered in the upper strata, and are undoubtedly of a character belonging to prehistoric times.”

By thorough study of ancient remains a pretty accurate knowledge of the habits, customs, manners, social,

* S. G. W. Benjamin, M.A., in *Troy, its History, Legend, and Literature*.

religious, and political condition of the people who have left no written records whatever, has been obtained. The term prehistoric man, however, as generally used, may include those nations like the ancient Egyptians, which have left us records in the form of inscriptions on monuments, tombs, and temples, and in papyri (paper scrolls), all of which are written in hieroglyphics, a system of picture and symbol writing; also those nations which have left us history handed down by tradition, and mingled with the fabulous and mythological. It is impossible to draw the



FIG. 7.—STONE ARROW-HEADS FOUND IN IRELAND.

dividing line between authentic history and mythology. By mythology is meant those stories of gods and heroes which characterize the early life of all nations. History and mythology blend into each other as imperceptibly as winter blends into spring,

Baldwin, in his "Prehistoric Nations," says: "The limits of history should be moved farther back into the past, and more importance should be allowed to some existing documents which it disregards."

In the oldest strata of the earth's crust, in which re-

mains of man have been found, only the rudest kinds of implements, such as arrows and spear-points made by chipping flint rocks are seen. It has been thought that these flint implements could not have been fashioned without the aid of metal tools, but different scientific men have succeeded by working patiently, in imitating them with no other tools than another stone or a piece of wood.

In connection with human remains, which have been found in later deposits, implements of more perfect structure have been discovered. The indications are, too, that the use of bronze, a metal made of tin and copper, was the first step in advance of the stone implement, and that later still the use of iron became known.

STONE, BRONZE, AND IRON AGES.

THE STONE AGE.

Those who have made a study of ancient remains have, therefore, divided the history of primeval man into three *ages*, called respectively the Stone Age, the Bronze Age, and the Iron Age. These divisions, they claim, are well marked in Europe. These stages are not represented in every country. In some countries the people are still in their stone age. The Australians use to-day stone weapons and tools. Figure 8 represents stone knives in use by the Eskimo. The natives of New Caledonia use iron implements along with axes of polished stone. Some of the native tribes of Africa use hammers and anvils of stone in fashioning tools of iron. The mere presence of stone implements, however, is no indication that the people are in a stone age as regards degree of civilization. The blacksmiths and tinkers of Ireland worked with anvils and hammers of stone until a comparatively recent period.

The Stone Age has again been divided into the Paleo-

lithic, or Old Stone Age, and the Neolithic or New Stone Age. The first is characterized by chipped stone implements only, and the second by polished stone implements as well. The Paleolithic has again been divided into the Mammoth Period and the Reindeer Period. These divi-

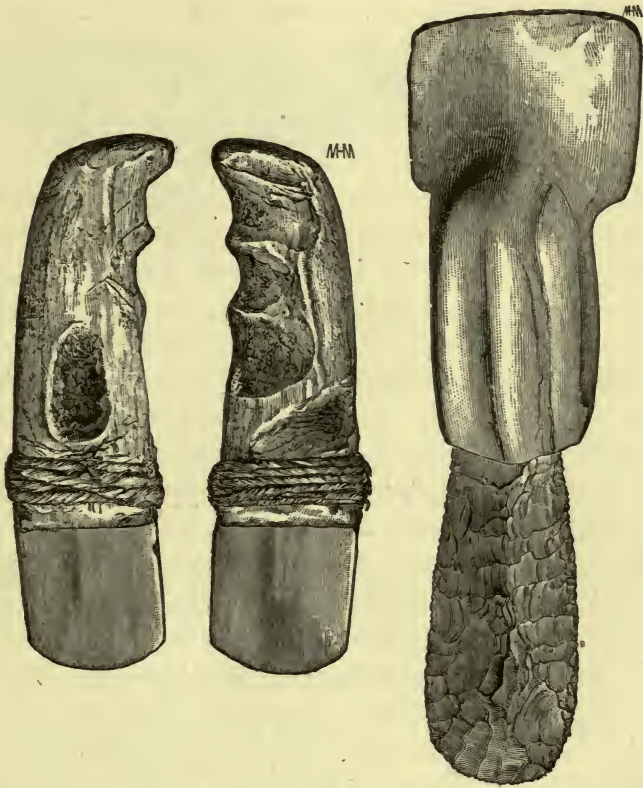


FIG. 8.—ESKIMO STONE KNIVES.

sions are so named because they are characterized respectively by the remains of the Mammoth and Reindeer. It is very probable that the man of the Mammoth and Reindeer periods lived mostly in caves, hunted the cave bear, the Irish elk, and the Mammoth, subsisted upon their

flesh, and clothed himself with their skins. He ornamented his body with trinkets made from shells and from the teeth and bones of animals, knew the use of fire, constructed rude vessels of pottery-ware, buried his dead in caves with funeral ceremonies, and believed in a future state. Some of these inferences at least are warranted by the revelations made in investigating a cave near Aurignac, discovered by a French peasant in 1842. A great slab of limestone covered an opening in the side of a hill. On removing this, the entrance to the cave was disclosed. Here were found seventeen human skeletons. These the authorities removed to a cemetery. In 1860 a scientific man hearing of the cave made a thorough exploration with the result of finding more human bones, flint implements, reindeer horns rudely carved, a number of pieces of sea shell perforated as though for beads, bones of the cave bear, rhinoceros, reindeer, horse, and other animals. On the outside of the cave were found ashes and cinders along with bones partly burned, and some that were split lengthwise, and others which had the appearance of having been gnawed by animals.

From these facts it has been inferred that the cave was the burial place of a family or tribe, and that along with the bodies were placed trinkets and weapons, while in front of the cave a grand funeral feast was held, the bones of the slaughtered animals being split to get at the marrow which was regarded as a delicacy, and finally, that the wild beasts gnawed the bones which were left by the guests. The fact that the bodies were carefully laid away in secure places and the weapons and ornaments buried with them, indicates a belief in a future state.

A skeleton found in a cave at Mentone on the Mediterranean also confirms some of these inferences. This skeleton was that of a tall, well-formed man, having more

than an average-sized skull. Stone implements and bones of extinct animals were in connection with the skeleton, and a circle of the perforated teeth of the stag lay around the skull, as though they had once been strung in the form of a chaplet for his head. These remains are considered by all as very ancient.



FIG. 9.—SWISS STONE AXE WITH WOODEN HANDLE AND SOCKET OF HORN.

During the periods in which the earliest men inhabited Central and Southern Europe the climate must have been colder than at the present time, for we find remains of animals which, from their coverings, would seem to have been adapted to colder climates. Many of the species of animals then existing are now found only in northern regions, and those which are extinct, as the mammoth, were covered with a thick coat of hair.

From the nature of the remains found in the earliest formations we may conclude that the most primitive men did not till the soil, or domesticate animals. The implements found are such as could be used only for hunting or fishing, as spear heads and arrow heads of stone, and fish hooks of bone. These men exhibited some taste and a degree of skill in drawing or carving, as attested by several specimens of ivory ornamented with sketches of the mammoth, the reindeer, the horse, and other animals. The picture of a cave bear was found traced on a pebble

and one of a fight between two reindeers, drawn on a fragment of rock.

In the Neolithic, or New Stone Age, we find a little higher condition of civilization. The implements of stone show much better workmanship, and many of them are polished. Remains of extinct animals are no longer found,



FIG. 10.—REINDEER-DRAWING OF CAVE MEN.

only those of species which exist to-day. The dog was probably a companion of man, as its bones have been found in connection with those of man. Agriculture was not yet attempted. Men probably ventured out to sea in boats, as bones of species of fish which never come near shore are found.

In some parts of Northern Europe there are found what are called "Kitchenmiddens." These are great heaps of shells mingled with bones of fishes, birds and mammals with occasional traces of fire, and implements of stone. This accumulation of refuse is supposed to have been the result of grand annual feasts, the primitive inhabitants collecting in great numbers, and eating the food furnished by these animals.

There are always found here associated shells of species which do not naturally exist in the same locality. Some of these shell mounds are 1,000 feet long, 200 feet wide and 10 feet high.

In many parts of Europe, especially in Denmark and France, are found what are called *Dolmens*. They consist of several large stones set upright and supporting larger flat stones. The common people call them by various names, such as *giants' graves*, *giants' beds*, *fairy tables*, *devils' tables* and *hag's beds*.

There are also in many places large stones called *menhirs*, set up in circles or rows. When they are in circles they usually take the name of *cromlechs*. One of the most

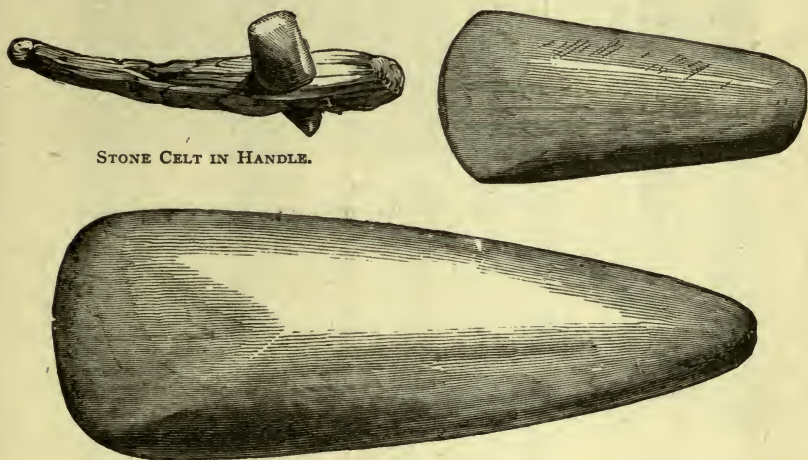


FIG. 11.—POLISHED STONE AXES, IRELAND

celebrated of these stone groups is known as Stonehenge, in England. These stone structures were believed to have been remains of sacrificial altars, or places of worship of the Druids, the priests of the religion of the ancient Keltic nations, but this is now doubted by many. Figuier thinks they were the burial places of men of the Stone Age and

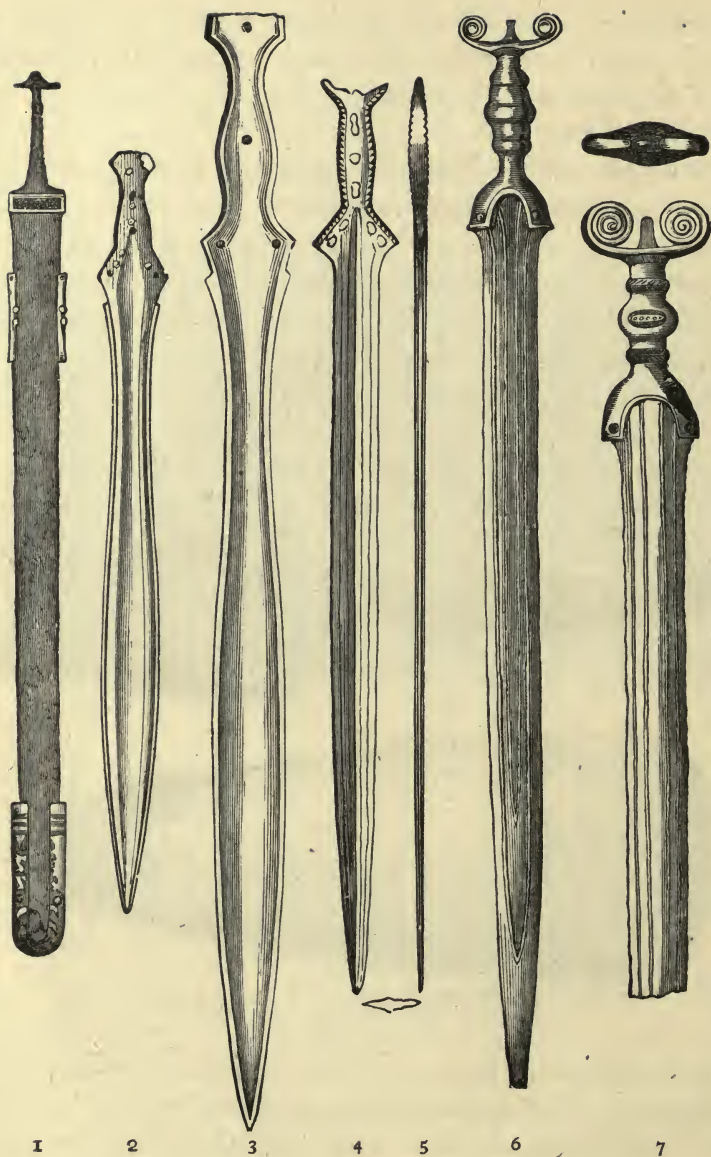


FIG. 12.—BRONZE SWORDS.

1, Iron Sword, Saxon. 2, Irish. 3, Swedish. 4, 5, 6, Swiss. 7, Scandinavian.

Sir John Lubbock says: "As regards Stonehenge, we have, I think, satisfactory reasons for attributing it to the Bronze Age."

Dolmens are found in great numbers in India. Captain Meadows Taylor obtained the particulars of 2,129 of them in one district alone, and about 1,100 had holes in the side, as represented in the accompanying cut.

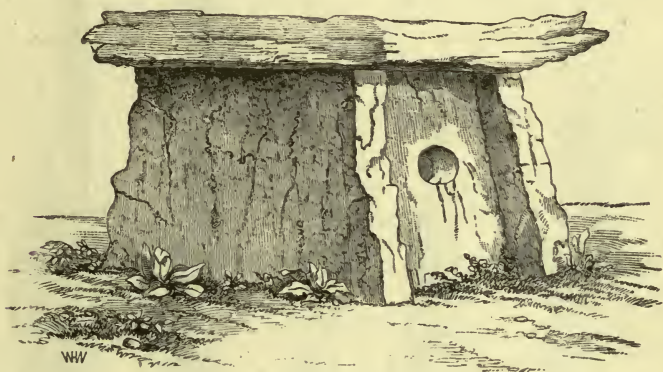


FIG. 13.—EAST INDIAN DOLMEN.

Some of those found in Europe contain these openings. These structures are supposed to have been burial places, and the holes in the side were for the introduction of food for the dead. Schoolcraft says that the North American Indians sometimes left an opening in the graves of their dead, that the surviving relatives might introduce food for the departed.

Stones placed in the manner of these *Dolmens* have also been found in mounds, or *tumuli*, as they are called, and some have thought that many of them were formerly covered with earth which had since been removed. Human skeletons and relics of the Stone Age have been found in these tumuli in a few instances, and the evidence is pretty conclusive that these dolmens were the burial places of men of the Stone Age.

THE BRONZE AGE.

In the Bronze Age we find further evidences of advancement in civilization. The metals begin to be used for making tools, weapons, and ornaments. We would not expect to find iron the first metal used by man, be-

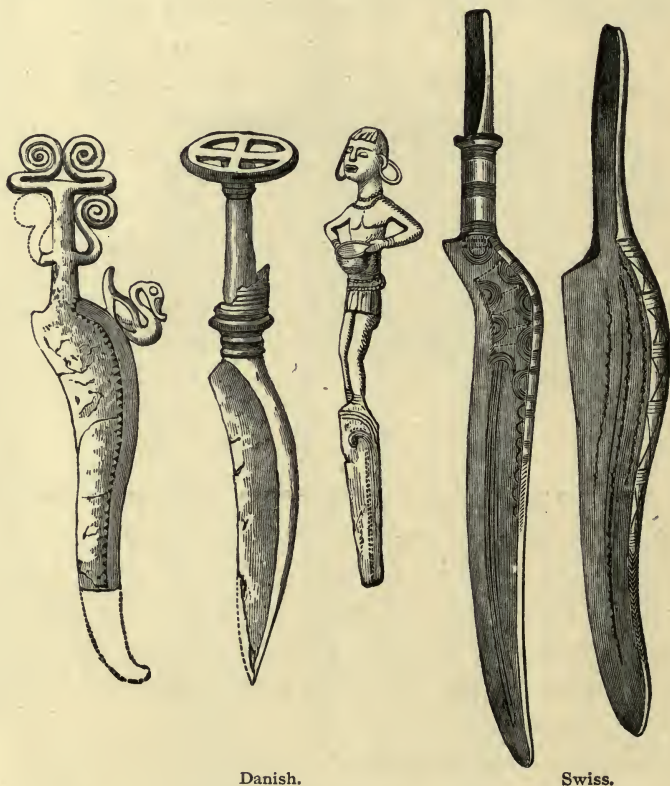


FIG. 14.—BRONZE KNIVES.

cause its ores do not readily attract attention, and the metal is not found in a free or native state, but always combined with some other element, and requiring a process of smelting to separate it. But copper, since it is often found in large masses in a pure state, would be more

likely to attract the attention of man. The North American Indians procured pure copper from the regions near Lake Superior, and hammered it into implements and ornaments. Tin is a metal not very widely diffused in nature, and does not occur in a native state. Bronze is a metal made by melting together copper and tin. Much of the brass spoken of in the Bible and other ancient records is supposed to have been bronze. The word in the original, which has been translated *brass*, should, according to good authorities, have been translated *bronze*. The brass which we are familiar with is a mixture of zinc and copper.

Now it is a singular fact that the most ancient metallic implements known are of bronze. One would suppose that the use of copper would precede that of bronze or tin. The question why we do not have a Copper Age preceding the Bronze Age is one which has excited a great deal of discussion among scientific men.

Bronze implements and ornaments have been found in nearly all parts of Europe in abundance, while they have been found but sparingly in other parts of the world. A few have been found in Mexico and other parts of America. The fact that bronze articles are the first in Europe has been explained in the theory that the manufacture of bronze was introduced into Europe from some other country. This opinion is expressed by Sir John Lubbock. Another has conjectured that but a short time elapsed between the knowledge of copper and that of the manufacture of bronze, and that but few copper articles were consequently made. This is probable, as the discovery of bronze was no doubt made by accident somewhat as follows: Copper being scarce, the ores of tin, which by their great weight had attracted attention, were added to the copper to increase the quantity. It was then

found when melted together, the new substance, or alloy, was much better adapted for making tools than the copper was. A few experiments would determine the proper proportions of the materials to make the best bronze. The articles made from copper are very few in Europe, but in America they are quite abundant.

The introduction of bronze into Europe has been ascribed to the Romans, but, as Lubbock has shown, bronze articles are never found associated with Roman coins or



FIG. 15.—BRACELETS, SWISS.

pottery, and the bronze of the Romans contained lead, which is not true of the bronze of Northern Europe; besides, the countries of Europe in which the most bronze articles are found were never known to have been invaded by the Romans.

The Bronze Age has been attributed to the Phœnicians, but there are serious objections to this view as well as to other theories concerning its origin. Ignatius Donnelly, in a work recently published, with the title of "Atlantis," thinks that the manufacture of bronze originated on the continent of "Atlantis," which he supposed to have once existed where the Atlantic Ocean now extends. According to this view, the Copper Age is lost to us. It

is true that implements of copper have been found in abundance in America, and evidence that the copper mines of Lake Superior have been worked in very ancient



FIG. 16.—BRONZE HAIR PINS, SWISS.

times. Masses of copper, propped up by logs, and bearing marks of having been hammered, have been found, and in the immediate neighborhood a number of stone hammers.

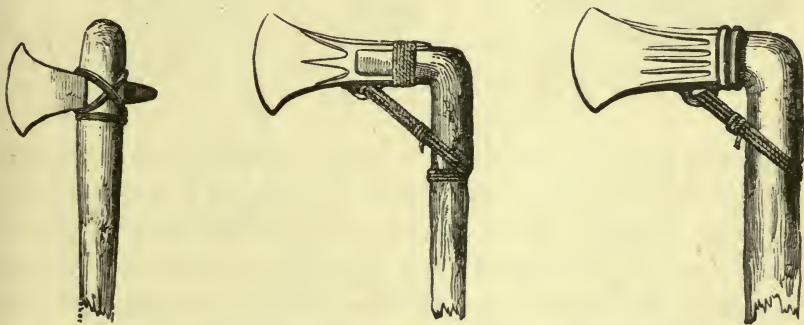
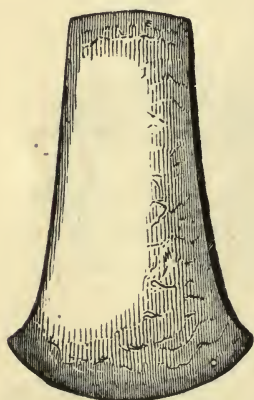


FIG. 17.—THREE DIFFERENT TYPES OF CELTS SHOWING INSERTION OF HANDLES.

This work has been attributed to the Mound Builders, a race which inhabited North America, and left traces of their existence in the form of earthworks of various kinds.

That these mounds and works are very ancient there seems to be no reasonable doubt, but what relation they bear in time to the Bronze Age in Europe is a question difficult of solution. The author of "Atlantis" points out many similarities between the implements of the Bronze Age in Europe and the copper implements of America, and also between the articles of pottery accompanying each.

The conclusion then would be that the inhabitants of this sunken continent "Atlantis" first used copper, and



Copper Celt.



Winged Celt, Ireland.



Socketed Celt, Ireland.

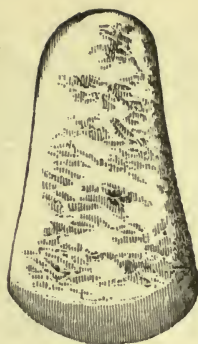
FIG. 18.—CELTS.

perhaps procured much of it from the mines of America, afterward learned to combine it with tin to form the metal bronze, which is much harder, and, therefore, more available for cutting tools, and from them the knowledge spread to the inhabitants of Europe, who, previous to this, used only implements of stone and bone.

The most common and characteristic objects of the Bronze Age are the so-called "celts" which were probably used for various purposes as battle-axes, hoes, chisels, etc. Some of them are finely carved, showing no small



Kalmuck Axe.

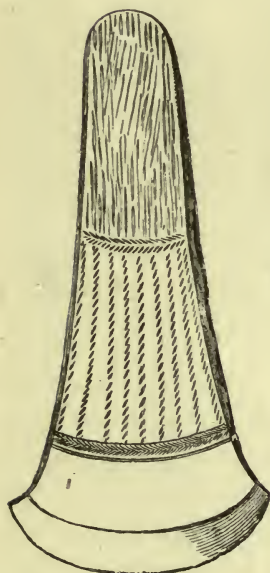


Copper (?) Celt, Ireland.

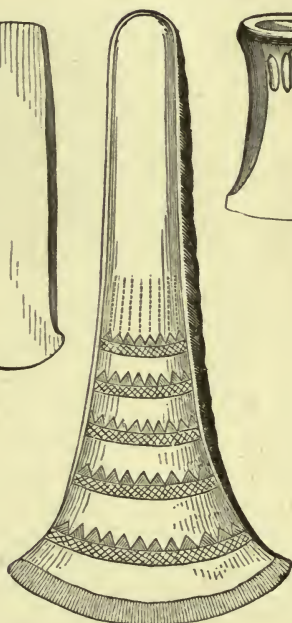
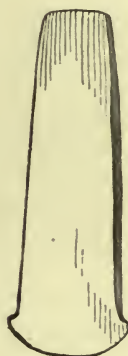


Celt Mould, Ireland.

FIG. 19.—CELTS.



Decorated Celt, Ireland.



Decorated Celts, Denmark.

FIG. 20.—CELTS.

degree of skill in art. Fig. 17 shows the manner in which they are supposed to have been fastened to handles. These implements were cast or moulded, and in the countries in which they were found, as evidenced by finding the moulds in the same connection. One of these moulds is shown in Fig. 19.

THE LAKE DWELLERS.

In Switzerland, Austria, and Hungary there are evidences of a race of people who dwelt in huts built over lakes on piles set in the ground, and projecting above the water. The remains of these piles are so numerous as to



FIG. 21.—URN APPARENTLY REPRESENTING A LAKE VILLAGE.

lead us to believe that whole villages were supported in this manner. The inhabitants probably chose this mode of life in order to be secure from attacks of wild beasts or human enemies. In South America, Africa, and New Guinea there are similar lake dwellings existing to-day. That the remains of these lake dwellings of Europe are very ancient is attested by the fact that dredging the bottoms of the lakes has brought to view an immense number and variety of articles of bronze and polished stone. Among the articles are weapons, agricultural implements, fishing tackle, and ornaments of various kinds. Bones of



SWISS LAKE VILLAGE.

domestic animals, as the ox, sheep, goat, and dog, remains of wheat and barley charred by fire, charred remains of a kind of plaited cloth, and traces of fruits, as the apple and the blackberry, were also found.

In the museum of Munich there is a piece of pottery which is evidently intended to represent one of the ancient Lake Dwellings. It is ornamented with double spiral figures which are characteristic of the Bronze Age decoration.

THE IRON AGE.

The discovery of the use of iron marked a great and important step in the civilization of man. There is no metal or substance, perhaps, which may be put to a greater variety of uses.

By means of simple tools man is able to construct tools of a more elaborate character, and with these he can accomplish a great variety of ends. The Iron Age was really the beginning of civilization. The possession of better tools enabled men to prosecute their inquiries in every direction. They dug into the bowels of the earth farther than before, and discovered gold, silver, lead and precious stones, and learned to manufacture them into ornaments, and coin metals into money. The potter's wheel by which more perfect earthenware vessels could be made with greater ease, was invented. The arts of painting and sculpture began to be developed. Dwellings and temples were built of hewn stone. Articles of use and ornament were constructed from wood, stone and metal. Agriculture began to be practiced on a much larger scale, and men ceased to rely altogether upon hunting and fishing for subsistence. Animals were domesticated and fruits were cultivated.

The Iron Age blends with the age of fable and

tradition, and this again with the age of authentic history, and it is impossible to draw any line of demarkation. Each nation has had its fabulous age, that is, we may trace its history back through written records which we have every reason to consider authentic until a period is reached when we have only tradition, or accounts handed down from father to son. These traditions which, in the main true, or having a true foundation, are so colored or exaggerated by successive repetitions that but little idea can be obtained of what was originally intended to be conveyed. The course of these traditions is similar to that of the simple and innocent statement of the truth made by one person but which becomes a startling scandal or a wonderful account by the time it has passed through the mouths of a number of village gossips.

The first histories of nations then, are fabulous and mythological. To illustrate further, let us suppose that in remote ages there lived in a certain country a man remarkable for his physical strength and endurance, just as we have to-day some prodigies in this line. Each father who knew this man, and had witnessed his feats of strength in performing physical labor, or overcoming his enemies, related the story to his children, perhaps exaggerating it a little as men are prone to do, and these children in turn told it to their children, and thus from generation to generation the story ran, gathering strength, as time advanced. When men learned to write and record their deeds, these traditions also were recorded, sometimes in poetry, and thus received additional embellishment.

In this manner would come to us in the form of a marvelous tale of a being with supernatural powers, a tradition which in the beginning was a simple, *truthful* account.

It will, perhaps, be interesting to the reader to know

how the scientists came to adopt the classification of Pre-historic man into the ages of Stone, Bronze and Iron, which has been almost universally accepted. The foundation for this classification was furnished by revelations made in searching in certain ancient peat bogs in Denmark, called "skovmoses," or "forest mosses."

These are swamps, or bogs, surrounded by dense forests and filled to the depth of thirty feet or more with peat, a substance composed mostly of partly decayed vegetable matter. It is evident that all this vegetable matter once grew in the bog, or on its borders, and that an immense period of time was necessary for its accumulation to such a great extent. In this peat are found trunks and branches of trees of various kinds, and in the midst implements and articles of stone, bronze and iron. Near the bottom of the bogs are found remains of pine trees of large size, and above them are oak trees. Beech trees are not found at all in the bog. Now, what is remarkable is the fact that the oak is found only in a few places in that country to-day, and the pines of the present day are only of a small and stunted kind, while the beech tree is the national tree of Denmark, and the oldest records and traditions give us no hint of a time when it did not exist. Along with the pine trees are found articles of stone, and above them, articles of bronze, while near the surface are found iron articles.

The inference from all this is, that at a very remote period the pine tree predominated in Denmark, and the country was inhabited by a rude race of people whose weapons and implements were only of stone, that they frequently traversed these bogs in quest of game, and lost these articles. The pine trees falling into the swamp from the margins, with their branches formed a framework, which collected moss and other small vegetation,



WARRIORS OF THE IRON AGE.

which caught and hid the lost articles, and which afterward became the peat of the lower part of the bog. The pine trees were in later ages superseded by the oaks, which also helped to fill up the bog, and formed a support of the Stone Age. This people was characterized by the use of articles made of bronze. As time passed on, the oak tree died out almost entirely, and its place was taken by the beech, which has continued to the present day, and has not yet left its record by becoming fossilized in the peat.

The above may not seem sufficient evidence to the unscientific reader, but the inferences drawn from these facts seem to be confirmed wherever remains are found. There seems to be a sort of relative chronological table furnished by these forest mosses, as well as by the deposits of mud, sand, and gravel made by rivers, and the incrustations formed in caves by the slow separation of solid matter from watery solutions.

THE MOUND BUILDERS.

There is abundant evidence that a race of prehistoric people inhabited the Mississippi Valley. In these regions are found to-day great numbers of artificial mounds of earth containing the imperishable remains of implements and ornaments, which have every evidence of great antiquity, and indicate some degree of civilization. History gives us no information concerning these people. The remains are found overgrown with forests of great age, and the inhabitants at the time of the discovery by Europeans, could give no explanation of them. Some description of these remains will be in order here. We call these people the "Mound Builders," for we have scarcely any information concerning them, save what these mounds reveal. These mounds vary in form, but are usually rectangular at the base.

Many of them resemble the pyramids found in Mexico. Some of these mounds are very large. One in West Virginia is 70 feet high and 1,000 feet in circumference at base. At Cahokia, Illinois, is one 700 feet long, 500 feet wide, and 90 feet high. Baldwin conjectures that these mounds were, many of them at least, constructed as foundations for the more important buildings of these people. In Mexico and Central America are found similar mounds, with ruins of stone edifices, which had been erected upon them. He thinks the buildings of the Mound Builders were of wood or some other perishable material. Besides



FIG. 24.—THE SERPENT MOUND,
ADAMS CO., OHIO.

mounds, many other earthworks are found, such as embankments many feet in length, and inclosures formed by walls of earth and stone. Some of these inclosures contain as many as 400 acres. At Hopeton, Ohio, are two inclosures, one an exact circle, the other an exact square, and each containing exactly 20 acres. In some few cases sun-dried bricks were used in forming the embankments.

Some of the embankments have the form of animals. In Adams county, Ohio, is one in the form of a huge serpent 1,000 feet in length. In front of its mouth, which is open, is an oval figure 160 feet in diameter. It is supposed to be symbolic of some superstitious notion concerning the serpent swallowing the egg. Near Newark, Ohio, there is a mound in the form of a gigantic bird. It is 155 feet long, and 200 feet in stretch of wings. In the same region is one in the shape of an alligator, 250 feet long. Sometimes the embankments are arranged as though intended for fortifications. Fort Ancient, in Warren

county, Ohio, is an example of this kind. The walls are built along the ledge of a hill. Where the hill is steep, the walls are low, and where it is less steep the walls are much higher. In Butler county, Ohio, is another fortified hill, with short, curved, and angular embankments within the gateways.

In the region of Lake Superior are found traces of ancient copper mining works. These mines, from their antiquity and the tools employed (implements of stone similar to those found in the mounds), it is evident were the work of the Mound Builders.



FIG. 25. —MOUND BUILDERS RELICS.

1, Stone Hatchet. 2, Stone Hammer Head. 3, Water Cooler. 4, Stone Pipe Bowl. 5, Copper Knife.

In Michigan are found a class of remains different from any yet described. They consist of a series of patches of ground elevated, and separated by sunken paths. These patches vary in dimensions from 5 to 16 feet wide, to 12 to 100 feet long, and from 6 to 18 inches in height, and are arranged in plats or groups. The compact prairie grass has preserved the outlines remarkably clear. It is the universal opinion of archæologists that these elevated plats were garden beds, either for the cultivation of flowers for ornament, or for food plants. Their

age can not be ascertained. Trees are found on some of them, which would indicate by their rings of growth that they began to grow before the discovery of the country by the French. There has been much speculation regarding these Mound Builders.

Were they the ancestors of the Indians? They were evidently not. While it is true that a civilized people may become degenerated, they never lose traditional recollections of their ancestors, and retain in their customs some peculiarities of their ancient civilization. The American Indians show no trace of a former more civilized condition, and besides, have traditions of their having come from the Northwest at no very remote period.

It has been thought that the Mound Builders came from Mexico and Central America. The reasons for this view are, 1. That their settlements were the most numerous near the south part of the Mississippi Valley, and on no place near the coast, except near the coast of the Gulf of Mexico. 2. The mounds and works bear great resemblance to the remains found in these countries.

They were probably an offshoot from the civilized race of people who inhabited Peru, Mexico, and Central America at a very early date. They perhaps gradually spread over the Mississippi Valley from the south, and, after a long occupation of the country, were finally driven out or exterminated by the race which we are accustomed to call the Aborigines or Indians. There is nothing to indicate that they were not a peaceful race, living by agriculture, and had attained a considerable degree of civilization.

Says Baldwin: "Could these works of the Mound Builders be restored to the condition in which they were when the country was filled with their busy communities, we should doubtless see great edifices, similar in style to

those in Yucatan, standing on the upper terraces of all the low and extended mounds, and smaller structures on the high mounds. There would seem to be an extension of ancient Mexico and Central America through Texas into the Mississippi and Ohio Valleys, and so, if there were no massive stonework in the old ruins of those countries, it might seem that the Mound Builders' works were anciently extended into them by way of Texas."

ANTIQUITIES OF MEXICO, CENTRAL AMERICA AND PERU.

But the most wonderful traces of a great past are found in Mexico, Central America and Peru. Here are found ruins of great cities, pyramids, and temples. It

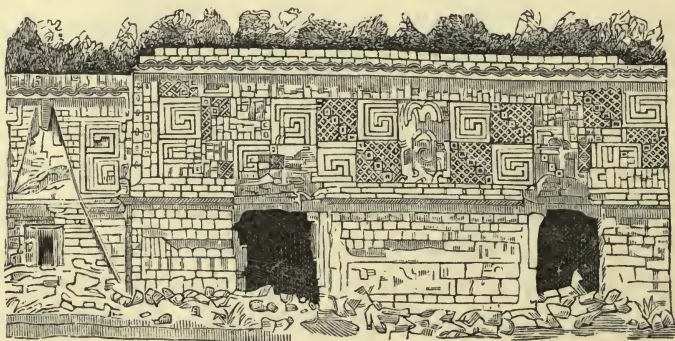


FIG. 26.—FRONT VIEW OF A PORTION OF A BUILDING AT UXMAL (YUCATAN).

is evident from an examination of these ruins, that they do not represent a single period of civilization. It would seem that there were successive changes among the inhabitants, covering, perhaps, centuries of time.

The most conspicuous building among the ruins at Uxmal is called the "House of the Governor." This building stands on the uppermost of three ranges of terraces, each walled with cut stone. The first terrace is five hundred seventy-five feet in length, and three feet high.

The second terrace is twenty feet high, the third nineteen feet above the second. The third terrace is ascended by a grand staircase of thirty feet in breadth and consisting of thirty-five steps. On this upper terrace stands a noble stone building of elegant proportions; three hundred and twenty-two feet long, thirty-nine broad, twenty-four feet high (see fig. 26). The lintels of the doorways and windows being of wood, the decay of these buildings has been hastened, otherwise they would remain almost perfect to-day. These ruins indicate a large city and a populous country.

Pyramids, in great numbers, are characteristic of Central Mexico. The great pyramid of Cholula is the largest, covering an area of forty-five acres. Its sides are built with four successive steps or terraces. In some of these pyramids are found galleries walled with stone, in which are elaborate sculptured decorations. Some are built of both earth and stone, others of immense blocks of cut stone laid in cement.

In Central America are ruins which appear to have a much greater antiquity than those of Mexico. Among the most noted are those of Palenque and Copan. Most of those ruins are found buried in dense forests, and were unknown to both natives and Spanish invaders until about 1750.

"The ruins (at Copan) extend along the river more than two miles. The numerous terraces and pyramids are walled with cut stone; and sculptured fragments abound throughout the ruins. Remains of carved heads of gigantic proportions ornament many of the terraces; and numerous colossal statues or idols of solid stone, from ten to fifteen feet in height, are found; some erect, others fallen. There are likewise many altars, each of a single block of stone; some richly ornamented, but each

differing from all the rest. Some are in their places before the idol, others are overthrown." The roof is covered by dense shrubbery. The ruins are situated in a heavy forest.

These ruins show that the builders of the edifices they represent were skilled in architecture and ornamental art. The workmanship is of the first order. The walls are in some instances covered with the very best plaster of Paris.

The cross seems to be the most common emblem among the figures in the sculptured walls. This led the



FIG. 27.—SOLID STONE ALTAR FOUND AT COPAN (HONDURAS).

Six feet square, four feet high, top covered with hieroglyphics.

early Catholic missionaries to believe that these ancient people had a knowledge of Christianity, and they fell into the belief that St. Thomas had preached the gospel there. But the cross is not a symbol peculiar to Christian nations. It had been used in Eastern countries centuries before the Christian era. The Phœnicians, the Assyrians and the ancient Egyptians, all used the cross as a symbol, as is shown by the remains of these people.

In Yucatan are remains of artificial ponds paved with masonry. In the bottom are passages which lead to wells or cisterns lined with stone, and extending in some cases

450 feet below the surface of the earth. As this country is noted for its dryness, the inhabitants took this plan to secure water in a dry season.

The antiquities of Peru, though very extensive and indicating a great civilization, differ greatly from those of Mexico and Central America. There are no inscriptions found. Hence, we conclude that these people had no written language. Their temples were not built upon mounds. The masonry, though well executed and massive, was rarely ever ornamented. There are remains of temples, fortresses, aqueducts and highways on an extensive scale.

The roads, or highways, were the most remarkable. They were from twenty to twenty-five feet in width, sometimes paved with stone, sometimes macadamized or cemented, and went over rivers along mountain sides, and through swamps. The road from Quito to Cuzco was, as a work of engineering skill and extent, equal to our Pacific railroads.

Judging from the remains of implements and ornaments these people of ancient Peru had attained great skill in agriculture, manufacturing and architecture. Their skill in working gold, silver and other metals was great, and from the number and nature of the articles of gold and silver these metals must have been mined to a wonderful extent. The Spaniards who invaded the country at a later date carried away many of these articles and melted them for coin.

But what does tradition tell us of the people who built the pyramids, cities and temples of Mexico, and the highways and temples of Peru? We have but little information.

The ancient inhabitants of Mexico were called *Toltecs*. They appear to have come from the Northeast, were a mild and peaceable people, industrious and enterprising.

After possessing the country for a long period of time they were supplanted by a race called *Aztecs*. They differed in many respects from the Toltecs, yet derived from them certain religious beliefs and customs. They had the revolting habit of sacrificing human beings to their gods, and everywhere their temples were stained with human blood.

These people existed and were in power when the



FIG. 28.—HUASCAR, 13TH EMPEROR OF THE INCAS.

Spaniards invaded Mexico in 1519. Here tradition blends into authentic history.

The Spaniards have given us wonderful accounts of these people. The earliest inhabitants of Peru, as tradition tells us, were civilized by the Incas. The word is said to mean in the Peruvian language, *the Sun*. These people worshiped the sun, and claimed to have originated from a pair of beings who came from that luminary. The coun-

try was conquered by the Spaniards in the sixteenth century, and from this time on authentic history tells the story. But, though tradition is silent on the subject, the remains mentioned above, indicate the existence of a civilized people who inhabited the country before the Incas. We do not even know the names of these people. We only know that the great works which we ascribe to them were not produced by the Incas, for the Incas themselves knew nothing of them. We conclude then, from the evidence presented, that long before the existence of the present race of Indians, before the Aztecs of Mexico, and before the Incas of Peru, there flourished a race of people in America who possessed a considerable degree of civilization, which flourished for a period of time that could be counted by centuries. For an extended account of the remains of these people, the reader is referred to "Baldwin's Ancient America."

There is sufficient evidence for the belief that Arabia was, in prehistoric times, the seat of a civilized people. Some ruins are found, which neither tradition nor history can explain. Comparatively little research has yet been made into the architectural remains of Arabia. The country has not been thoroughly explored, and no excavations have been made. But certain traditions and historical allusions of ancient writers point to a time when Arabia was a populous, wealthy, and powerful commercial state. It was undoubtedly the Land of Cush of the Hebrew Scriptures, and the Ethiopia of the ancient Greek writers. The Cushites had a peculiar system of government different from most ancient nations. It approached the republican or democratic form of modern times. The political system of the Phœnicians and Greeks probably had its origin here. Lucian, a celebrated ancient writer of Syria, said: "It is commonly understood that the

Ethiopians were the first who invented astronomy, being led to this science by their cloudless sky and favorable climate, and by their surprising intellectual sagacity, subtilty, and force." We have some of the earliest traces of a mathematical knowledge coming from Arabia. The nine digits we use to-day are of Arabian origin, and the word algebra is an Arabian word.

The Phœnicians were an enterprising people, who once lived upon the eastern shore of the Mediterranean, and known in historic times to be highly civilized. They were early noted for their commercial importance, and their knowledge of many of the industrial arts. Tyre and Sidon, of Scripture mention, were principal cities of Phœnicia. Carthage, so famous in history, was one of their colonies. The ancient writers, as Herodotus and Josephus, refer to the Phœnicians as being a people of great antiquity in their day. There is evidence that in prehistoric times the Phœnicians were a great civilized people, and were an offshoot of the ancient Arabians. The Phœnicians originated the first alphabet which came into general use, and from them the Greeks probably derived their alphabet.



EGYPTIAN HEAD.

CHAPTER VI.

THE DAWNINGS OF HISTORY.

The Chaldeans and Assyrians, or Babylonians, were also a mighty people of ancient times, whose origin is wrapped in obscurity, but the antiquity of their civilization is undoubted. There seems to be evidence of their derivation from the Cushites or ancient Arabians. Babylon



FIG. 30. ANCIENT EGYPTIAN CHARIOT.

was well known as one of the greatest cities of the world, but no one can tell when it was founded.

One of the oldest and most perfect of languages is the Sanscrit. The people who used it were called Hindoos, and inhabited what is now called Hindostan or India. It is believed that prior to these people, the country had been settled by the Cushites from Arabia.

The most ancient historic people were the Egyptians, and as far back as history traces them they seem to have been highly civilized. Wilkinson says: "Their great antiquity enables us to understand the condition of the world long before the era of written history; all existing monuments left by other people are comparatively modern; and the paintings in Egypt are the earliest descriptive

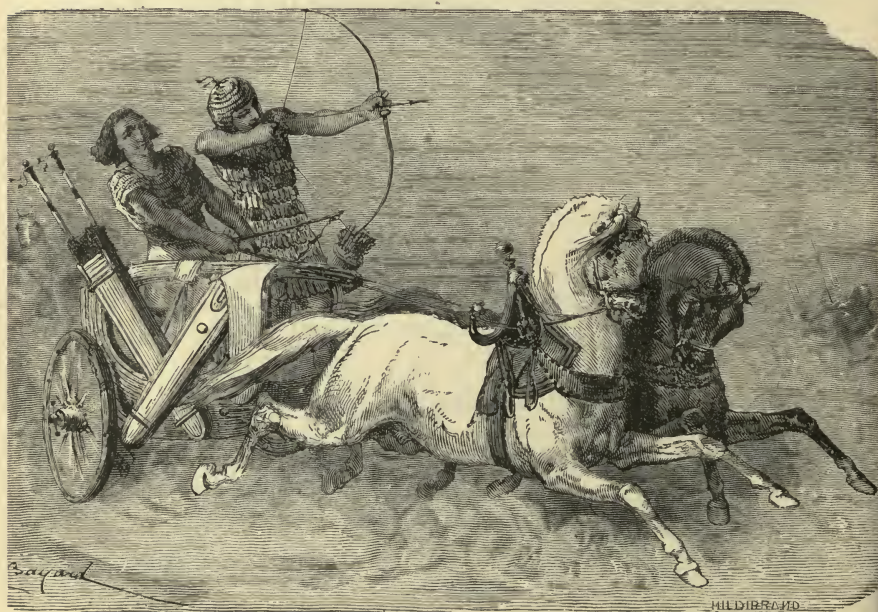
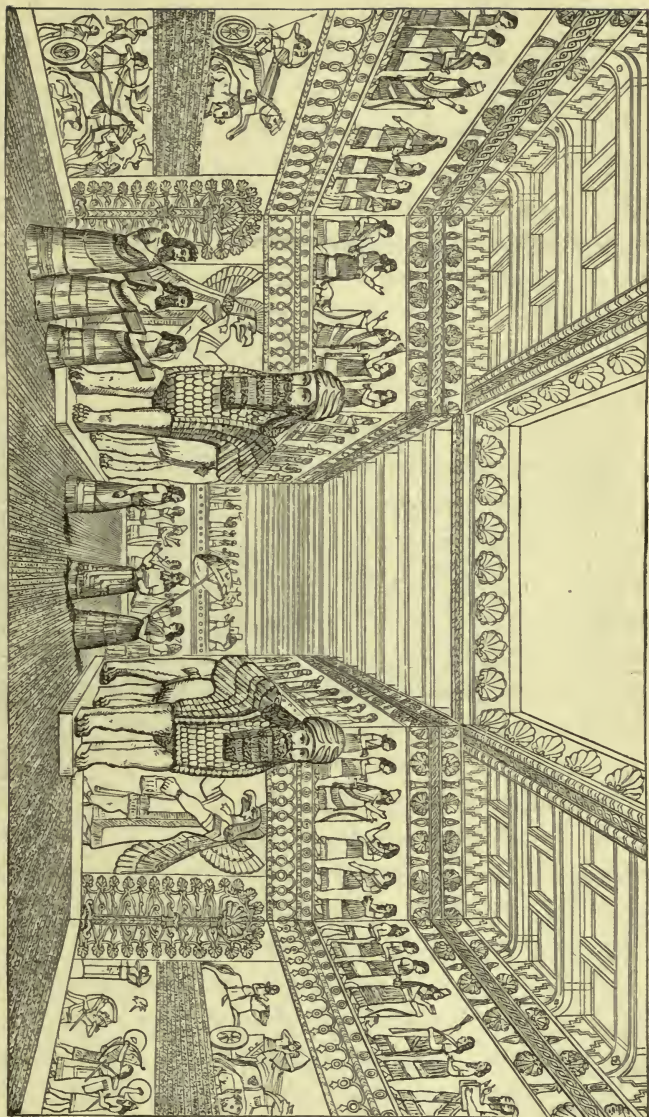


FIG. 31.—EGYPTIAN CAVALRY.

illustrations of the manners and customs of any nation." Says Dr. Schmitz: "No nation has ever so fully portrayed itself, in all its pursuits, religious, social, and military, as the Egyptians. These paintings give us great insight into their private life. The style of their dwellings, their furniture and decorations, their amusements, religious ceremonies, mode of government, military knowledge, customs,



ASSYRIAN PALACE (RESTORED.)

and modes of eating and drinking, modes of burial, methods of agriculture, their knowledge of astronomy, and other sciences, are all depicted in their paintings.

The paintings, as works of art, are dull and lifeless. They seemed to have no knowledge of the laws of perspective. But, notwithstanding their pictures are little better than an uninstructed child could produce, they represent objects and actions as plainly as words could do.

The inscriptions on their temples, tombs, and monuments, and the writing in their papyri (paper books), are in characters called hieroglyphics. They consist of pictures and symbols, which represent ideas. These hieroglyphics have been in a great measure deciphered. They had an extensive literature, but, like their art, it was dull and lifeless. The people were of the Caucasian race, and their language was of the great division of languages called Semitic. (See chapter on Languages and Races.) Their government was despotic. The priests had great power over the people. Many of their laws, however, were salutary.



FIG. 33.—QUEEN AIDING KING,
(TEMPLE SERVICE, EGYPT.)

They possessed many arts which we have considered of modern invention. Among these was making glass. Their paintings represent men in the act of blowing glass, and a number of glass beads and other ornaments have been found. They had the art of coloring glass, and of making beautiful mosaics of variously colored pieces fused together. Winckelmann thinks "the ancients carried the art of glass making to a higher degree of perfection than ourselves."

They had made considerable progress in science, espe-

cially mathematics and astronomy, as the pyramids and other remains would testify. They probably knew the use of iron. This is inferred from pictures. Some of these represent butchers sharpening knives upon round bars of something which is painted blue, and supposed to be steel. Others represent weapons of different kinds, and some are painted red, supposed to be bronze, and others blue, supposed to be iron or steel. It is also inferred from the fact that very hard rocks, as granite, are carved with a great degree of fineness, a thing impossible to do without a metal harder than bronze or copper.

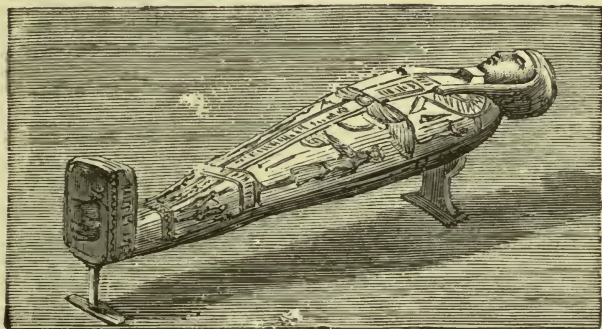


FIG. 34.—MUMMY IN CASE.

Their money was in the form of rings of gold and silver.

They had the art of embalming or preserving bodies. In this they have never been successfully imitated. These embalmed bodies are called mummies, and numbers of them exist to-day in museums throughout the world. (Coffin, page 343, sarcophagus, page 368.) Some pictures represent them as playing certain games resembling our games of checkers, or chess. They seemed to have all the vices of modern times, as pictures in some cases represent men drinking wine, and others being carried home in a state of intoxication.

The Valley of the Nile is the most fertile spot in the world. This great river overflows its banks annually, depositing as it subsides, fertilizing material brought down from its upper course, thus keeping it continually enriched. This valley is literally strewn with remains of cities, temples, obelisks and pyramids. The buildings were, many of them, of colossal size, and the obelisks and pyramids are the wonders of the world. No one knows when they were built, nor for what purpose, but it is supposed that they were built at various periods, and usually to commemorate some great ruler. This has been proven with regard to some of them.

One of the most remarkable of these structures was the temple of Karnak in the great hall of which were twelve massive columns sixty feet high and twelve feet in diameter, and 122 other columns forty-nine feet nine inches high, and twenty-seven feet six inches in circumference. There were two obelisks ninety-two feet high and eight feet square in front of the entrance.

The pyramids are immense structures of stone, built in the most durable form, and containing interior chambers. They were probably the burial place of kings. The largest of the pyramids is 480 feet high, and 764 feet square at base. The obelisks were pillars or monuments consisting of a shaft or a single stone, resting on a pedestal or base. They were probably erected as memorials to departed rulers. The largest is now in Rome having been transported thither from Egypt by the Emperor Constantine. It is 105 feet in length of shaft. It contains hieroglyphics which have been interpreted to be the names of certain kings. One called "Cleopatra's Needle," was presented to the United States by the Khedive of Egypt, and has been transported to New York and erected. It is seventy feet in height, with a diameter at base of about

seven feet, and composed of red granite or Syenite. It would indeed require many pages of this work to describe all the arts, occupations, amusements and customs which

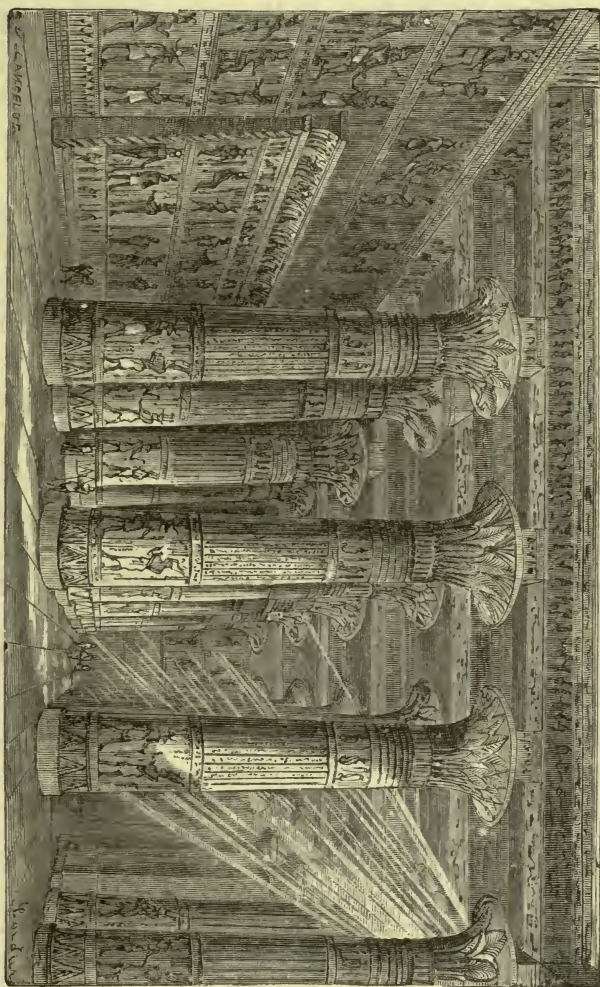


FIG. 35.—HYPOSTYLE HALL IN TEMPLE AT KARNAK.

these pictures and remains show to have existed in these prehistoric times among the ancient Egyptians. Suffice it to say, that they had in some degree or manner, nearly

everything in these lines that we have to-day, and what we may consider as modern inventions and discoveries, were known to these ancient people.

The oldest timber, perhaps, in existence is that found in some of the ancient temples of Egypt, ascertained to be at least four thousand years old. This wood appears to be the tamarisk or shittim wood spoken of in the Bible. It is in the form of ties, used to hold the blocks of stone together. A groove was made in each stone, and when laid, a piece of wood, in the shape of an hourglass, was fitted into it, dovetailing the masonry together.

Some knowledge of primeval man may be obtained by a study of languages. Thus, when we find the same root words occurring in the language of several different nations, we infer that they sprang from common ancestors. The words for father, mother, brother and sister, in the language of the Greeks, Romans, Goths, Hindoos, Persians and Kelts being nearly the same, is evidence that these nations were once one people, while the fact that the names of tools and articles belonging to a moderately civilized condition are quite different, shows that these people have long been separated.

From a comparison of certain words in the languages of these nations, we are justified in saying that the original stock from which they sprung dwelt in houses, and were acquainted with the art of navigation. Thus the word for house in the Sanskrit is *dama*, in the ancient Persian *demana*, in Greek *domos*, in Latin *domus*, in Irish *dahim*, in Slavonic *domu*. The word for boat in Sanskrit is *nau*, in Persian *naw*, in Greek *naus*, in Latin *navis*, in Irish *noi*, in old German *nawa*. By similar means we also know what the ancient Greek writers could not tell us about the early Greeks. There are 2,000 words in the Greek language, which are almost identical with the Sans-

krit. From the fact that certain words are common to both languages, we know that when the Greeks left Central Asia they had a familiarity with oxen, horses, dogs, swine, goats, and geese, were acquainted with metals, used salt, had boats propelled by oars, divided their year by moons, and had a decimal notation. This migration must have been very early, as none of their writers have any knowledge of the time, and there exists only faint traditions of their Asiatic origin.

Lazarus Geiger says man had language before he had tools, and before he practised industrial arts. He shows this by a number of examples like the following: The word which means to grind, is nearly the same in several languages, as Latin, Greek, and German. Now the practice of grinding food between two stones, or by a mortar and pestle, is a very ancient one. Stone mortars and pestles are found among the most ancient relics. But the word which means to rub between the fingers and to grind with the teeth, is very similar in some of these languages to the word which means to grind in a mill, and it is no great stretch of imagination to suppose that man talked about grinding food with the teeth and rubbing with the fingers before any instrument for grinding had been constructed. It is very likely, also, that the act of grinding food with the teeth suggested the idea of the mortar and pestle, and the machine, when constructed, was named from the word which meant originally to rub, as with the fingers or between the teeth; and the word which designated the act of grinding in a mill came from the same root. The first tools were probably only sticks or stones, which were picked up and used for various purposes. The first spade was merely a stick, which could be pushed into the ground. The first knife a splinter of stone or wood, accidentally broken so as to have a sharp

edge. The first hoe or mattock a stick with a crook approaching a right angle. The bow and arrow were probably suggested by observing a stick or pebble thrown to a distance by the recoil of an accidentally bent twig.

Geiger has observed that our common tools are never named from the process by which they were made, but from the work they are intended for. Thus a pair of shears, a saw, and hoe are things that *shear, saw, and hoe*. He infers from this that the first tools were not made, but were simply objects accidentally found, and used for certain purposes. He observes further, that articles which are not tools, are named from the material of which they are made, or the work which produced them.

One tool or instrument may have suggested another, as it is thought the stringed musical instrument was suggested by the sound made by pulling the string of a bow.

The first garments worn were doubtless the skins of animals. Necessity drove men to kill animals for food. Taking off the skin to get the flesh, the idea of its use would naturally arise in the mind. But the art of weaving or plaiting was early developed. History tells us of no time when it was not known. Perhaps the sight of the interlaced branches of trees, and the protection afforded by foliage, suggested the idea of making garments by weaving. The spider's web and the nests of birds may have suggested the idea.

Geiger says : "These are words in which the idea of the entanglement of the boughs of the bush or of trees with dense foliage is found so intimately allied with the plaiting of plants, that it becomes probable this natural plaiting may have served the artistic activity of man as a model." Comparing primeval man to children, we may notice the tendency the latter have in play to weave and

plait garlands from grasses and leaves. The first dwellings were probably trees, and their spreading branches and dense foliage suggested the idea of a house for shelter. In colder regions, caves were used for dwellings, as the remains found to-day abundantly testify.

USE OF FIRE.

It is no fanciful conjecture when we say that the knowledge of fire was one of the greatest boons mankind ever received. It gave him a mighty impetus in his progress toward civilization. He could not only make his food more palatable and exist independent of climatic changes, but it led to greater perfection of the social state. The camp fire and the hearthstone have been renowned throughout all historical ages as factors in binding together mankind in groups, and elevating his social nature. The useful arts could never have reached any degree of proficiency without fire. It is then, no wonder that fire has been, and is still, in many nations an object of worship.

We who are accustomed to using matches can not appreciate the difficulty the ancients had in getting a fire. When Magellan discovered the Ladrone Islands in 1521, the people had never seen fire. To punish them for thieving, he had some of their villages set on fire. The savages regarded the fire as a kind of animal, which ate up the wood, and those who came near enough to get burned said they were bitten by the animal. Some of the Australian tribes, it is said, do not know how to make a fire. We also read of tribes, who, when their fire goes out, borrow of another tribe. It is a well-known fact that many nations have had the custom of keeping fire in their temples, and had persons appointed whose duty it was to see that it never went out. This is usually considered to

mean only a religious ceremony, but there was evidently a stronger reason, the necessity, or at least the convenience of keeping fire, so that they would not have to originate it again.

The savage to-day makes fire by friction of two pieces of wood. This requires no small degree of skill and dexterity. If any one doubts this, let him try it himself. As an improvement on merely rubbing the sticks together, some use the fire-drill, which consists of a round stick made to turn rapidly in a hole in a block of wood. This

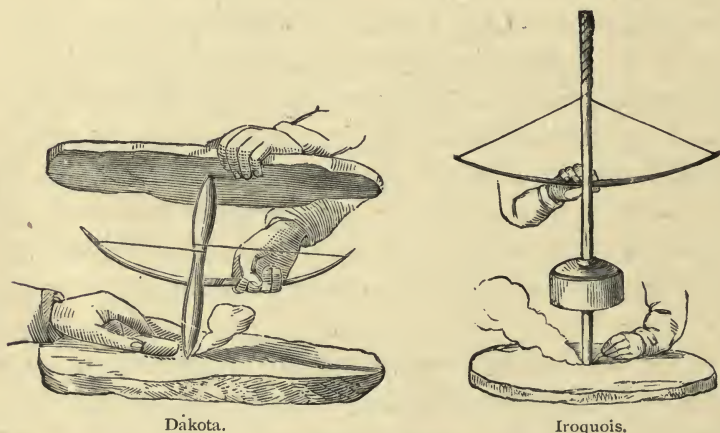


FIG. 36.—FIRE DRILLS.

stick is often made to revolve very rapidly by means of a cord wound round it, and pulled back and forth by the hand. Sometimes a bow is fixed to the string and worked back and forth, as some drills are now made for other purposes. Fire was often made among primitive people by striking together two pieces of flint. The Chinese strike together two pieces of bamboo which contains silica. The Malaysians make fire by compressing air in a wooden or ivory tube.

Of the myths and legends concerning the manner in

which man first procured fire we may mention the Greek fable of Prometheus, the god who stole fire from heaven, and brought it down for the use of man (see Chapter I). and the Hindoo myth, which represents the god Agni, or the heavenly fire as concealed in a casket, and forced to come out by another being who presented him to the first man. These two myths have something in common, for the word Prometheus is of Hindoo origin, and means to obtain by rubbing, evidently relating to the method of procuring fire by friction, which idea is closely connected with that of robbing or getting by force. Was there a time in the history of man, when he did not have a knowledge of the use of fire? We do not know. We only know that, with the earliest traces of man, are traces of the use of fire. Man doubtless saw the actions and effects of fire before he learned how to produce it. The lightning sometimes sets objects on fire, and fire escapes from the earth in volcanic regions. The idea of producing fire by friction probably occurred to man when he noticed the heat produced by polishing his stone implements.

Man probably at first ate all of his food in a raw state. The art of cooking was no doubt discovered by accident. The reader of Charles Lamb's works will here recall the "Dissertation on Roast Pig." The humorist imagines a time in the history of China when men ate their meat raw, but by accident a house was burned containing a litter of pigs. A boy happening to burn his fingers in handling the charred remains of a pig, put his fingers in his mouth, and, getting a taste of the roast meat, was so intoxicated with the new pleasure that he did not stop until he had devoured the whole of it. Thus man learned to eat cooked meat.

A dire necessity drove men to eating each other. It was this or starvation. The taste acquired, it was kept

up from choice among some tribes. We must not infer that prehistoric men, however, were as a rule, cannibals. It was then as it has been in later times, the rare exception. The flesh of animals, and those fruits and seeds which needed no preparation, were the principal articles of food before the use of grain became general.

ORIGIN OF POTTERY AND DECORATION.

Some North American Indians make a hole in the ground, press into it the skin of an animal, and in the vessel thus formed they put water and flesh, and boil it by dropping in stones heated in a fire near by. Before the discovery of pottery, if man knew the use of boiling water at all, something like this must have been employed. Before the Europeans came to their country, the inhabitants of Tahiti knew nothing of boiling water.

“The print of a horse’s hoof in the wet earth, a piece of clay hardened among the cinders on the hearth, or merely dried in the rays of the sun, may have suggested,” says Joly, “the idea of employing earth to make vessels for holding water, fruits, or any kind of provisions.”

The art of pottery-making, however, does not seem to be as ancient as many other arts, but its development seems to have been rapid, and the remarkable variety of articles of use and ornament which can be made of it is simply astonishing. Improvements are still going on in this art, as they have been for centuries.

Nearly all savage tribes know how to make fermented liquors. The remains of certain berries along with other remains, have led some to conclude that prehistoric man knew the use of fermented drinks.

As already hinted, the inclination toward art was very ancient. The most savage nations tattoo or paint their bodies, and wear ornaments of shells, bones, etc., and the

child at an early age delights to draw pictures and use paints. From this desire to imitate an object by drawing, it was but a step to the communication of ideas by means of pictures. This picture writing was the first attempt at a written language. It still exists among our Indian tribes. The use of an alphabet, consisting of signs or letters to represent sounds, sprang from this picture writing. This is evident when we know that the letters we use to-day are but modified pictures of some objects ; thus, A is but the picture of an ox's head ; B, of an ox-yoke, and so on, the resemblance even now being not difficult to see.

THE FIRST OCCUPATIONS OF MAN.

The earliest occupation of men was no doubt that of hunting. Unless in a country where the earth brings forth spontaneously sufficient food for man's subsistence, he would be compelled to resort to the chase. There is every reason for believing that man hunted animals, and subsisted upon them, and the spontaneous products of the earth, before he domesticated animals or cultivated the soil. The earliest relics of man are mostly implements of the chase. The next step would be the domestication of animals, and the occupation of the shepherd would arise. Following this very closely, if not in fact co-ordinate, would come the tilling of the soil, in other words, the domestication of plants. Thus the animal and vegetable world would come gradually under man's control. But growing right along with these would be the fashioning of tools, the manufacture of clothing, and the building of habitations.

As a community increased in size, there would naturally spring up a division of labor, and thus the people would be divided off into these four occupations, the

hunter, the shepherd, the farmer, and the artisan. Barter and trade was doubtless a characteristic of the earliest men, but perhaps it was not till a comparatively late stage that men pursued the business of trading as an exclusive occupation. Commerce, as a regular business, could not have arisen until a considerable surplus of useful articles had been produced in a community, or until there was a demand for products of other regions.

The professions of priest, physician, teacher, and lawyer were at first united in one. We can not trace the history of man back to a time when he had no religion. Though denied by some, yet the evidence of the best authority is on the side of the statement that the rudest tribes to-day have some sort of religious belief, low and crude though it may be. The priests, then, were the first professional men; they healed, or pretended to heal, the sick, made the laws, and instructed the people generally, often, indeed, abusing their authority, and tyrannizing over the ignorant lower classes.

LOCATION OF MAN'S BIRTHPLACE.

In what part of the world did the human species originate, or in other words, what country has the oldest human history?

Did man have a single geographical origin, or did he spring from different stocks, which originated in different parts of the earth? These are questions which have occupied the minds of scientific men to no small degree. Under the head of prehistoric man, it would seem appropriate that we give a resume of the opinions held on these questions.

Some at least, of the believers in Evolution are inclined to ascribe a *multiple* origin to man. Those who follow the prevalent idea that Adam and Eve were the

parents of the human race, of course regard man as having a *unity* of origin. Quatrefages is a great advocate of the latter view, though he bases his arguments altogether on scientific grounds, laying aside any religious bias. He also expresses an opinion as to the part of the earth in which he originated. He says: "According to all probability, the center of human creation was toward the middle of Asia."

Agassiz makes the statement that there were "an indefinite number of primordial races created separately," but he contradicts this when he says, "In spite of the diversity of his races, man always forms one and the same species." The Evolutionists differ among themselves as to the centers of origin, but I think all will agree that man originated in tropical or sub-tropical regions. The garden of Eden is generally supposed to have been located in Southern Asia.

Prof. Winchell argues from scientific grounds, backed up by historical and traditional evidence, that man must have originated in the Orient, and says that "there is no room for doubt that man first placed foot upon the earth in that quarter, to which our Scriptures assign the garden of Eden. Louis Figuier, in his book "The World before the Deluge," says: "We think with many naturalists, that the stock of humanity is unique, and that the different human races, the negroes,—the yellow race,—are only the result of the influence of climate upon organization. We consider the human race as having appeared for the first time (the mode of his creation being veiled in Divine mystery, eternally impenetrable to us) in the rich plains of Asia, on the smiling banks of the Euphrates, as the traditions of the most ancient races teach us. It is there where nature is so rich and vigorous, in the brilliant climate, and under the radiant sky of Asia, in the

shade of its luxuriant masses of verdure, and its mild and perfumed atmosphere, that man loves to represent to himself the father of his race as issuing from the hand of his Creator."

Donnelly, the author of "Atlantis," thinks that man originated on the continent of "Atlantis." This doctrine of the existence of "Atlantis" is not a new one.

"This book," he says, "is an attempt to demonstrate several distinct and novel propositions. These are :

"1. That there once existed in the Atlantic Ocean, opposite the mouth of the Mediterranean Sea, a large island, which was the remnant of an Atlantic continent, and known to the ancient world as Atlantis.

"2. That the description of this island, given by Plato, is not, as has been long supposed, fable, but veritable history.

"3. That Atlantis was the region where man first rose from a state of barbarism to civilization.

"4. That it became, in the course of ages, a populous and mighty nation, from whose overflowings the shores of the Gulf of Mexico, the Mississippi River, the Amazon, the Pacific coast of South America, the Mediterranean, the west coast of Europe and Africa, the Baltic, the Black Sea, and the Caspian, were populated by civilized nations.

"5. That it was the true Antediluvian world, the Garden of Eden, the Gardens of the Hesperides, the Elysian Fields, the Gardens of Alcinous, the Mesomphalos, the Olympos, the Asgard, of the traditions of the ancient nations, representing a universal memory of a great land where mankind dwelt for ages in peace and happiness.

"6. That the gods and goddesses of the ancient Greeks, the Phœnicians, the Hindoos, and the Scandinavians were simply the kings, queens, and heroes of Atlantis, and the acts attributed to them in mythology are a confused recollection of real historical events.

"7. That the mythology of Egypt and Peru represented the original religion of Atlantis, which was Sun worship.

"8. That the oldest colony formed by the Atlanteans was probably Egypt, whose civilization was a reproduction of that of the Atlantic island.

"9. That the implements of the 'Bronze Age' of Europe were derived from Atlantis. That Atlanteans were also the first manufacturers of iron.

"10. That the Phœnician alphabet, parent of all the European alphabets, was derived from an Atlantis alphabet, which was also conveyed from Atlantis to the Mayas of Central America.

"11. That Atlantis was the original seat of the Aryan or Indo-European family of nations, and possibly also of the Turanian races.

"12. That Atlantis perished in a terrible convulsion of nature, in which the whole island sank into the ocean, with nearly all of its inhabitants.

"13. That a few persons escaped in ships and on rafts, and carried to the nations east and west the tidings of the appalling catastrophe, which has survived to our time in the Flood and Deluge legends of the different nations of the old and new worlds."

Without expressing assent or dissent, I would simply say that very many facts are explained by this theory, which are not otherwise clear. Plato, the Greek philosopher, who relates the story as far as can be discovered, had no motive in falsifying. His narrative is a plain statement, containing no tales of supernatural beings or occurrences. It is an account of a people who were civilized, built cities and temples, practiced arts and agriculture, and carried on commerce. The Atlantic Ocean is shallow at the place where Atlantis is described as having existed,

and the Canary and Azores islands may have been the tops of Atlantean mountains.

The word *Atlantis*, *Atlantic*, and *Atlas* can not be traced satisfactorily to any language of the Old World. When Columbus discovered America, there was a city in Darien called Atlan. This lends support to the view that Plato did not originate the name Atlantis. Some naturalists suppose that there once existed a continent where the Indian Ocean is, at present. Sclater calls this sunken continent Lemuria, from the Lemurs, or half-monkey species which inhabit the neighboring islands. Haeckel thinks that here the human genus had its origin, and diverged to the different continents.

Says Quatrefages: "We know nothing of primitive man; we acknowledge that from want of information, it would be impossible to recognize him. All that the present state of knowledge allows us to say is, that, according to all appearances he ought to be characterized by a certain amount of prognathism (projecting of jaws), and have neither a black skin nor woolly hair. It is also fairly probable that his color would resemble that of the yellow races. Finally, everything tends to the conclusion that the language of our earliest ancestors was a more or less pronounced monosyllabic one."

It is the opinion of this naturalist that the yellow color originally predominated. He infers this from the fact that when the pigment matter which gives color to the skin is examined with the microscope, the yellow color is always present, and when the white and black races are crossed, the yellow appears in the mulatto. There is but little essential difference between yellow and red. There may be some significance in the fact that the word Adam is said to mean "red."

BOOK II.

MAN IN HISTORY.

CHAPTER I.

THE RACES OF MEN.

Man is now considered by nearly all naturalists to be one species. Species is defined as a collection of individuals, which have descended from a common ancestry, and resemble in all essential particulars. Among domestic animals and plants especially, there seems to be a great tendency to vary in slight particulars from the original parent type. These variations tend to perpetuate themselves, and thus we have what are called varieties of the same species. Man also varies greatly in such important particulars, as color of skin, character of the hair, shape of the features, stature, etc.; but in the necessary parts and qualities, which make up a man as distinguished from another animal, all men agree.

The animal kingdom has been divided by common consent among naturalists into *sub-kingdoms*, based upon certain very general plans of structure, and these again into *classes*, based upon more particular differences of structure. The classes have again been divided into orders, the individuals of each of which differ in marked degree from those of the others. The orders have been divided again into *genera* (singular, genus). A genus includes all

animals which have more points of resemblance than of difference. The genus is made up of species.

Now no one hesitates to place man in the sub-kingdom *Vertebrata*, which includes all animals which have a back bone or spinal column, and red blood. This classes him with the dog, the horse, the bird, the snake, the frog, and the fish; but it separates him from the oyster, the snail, insects, the star-fish, and the like.

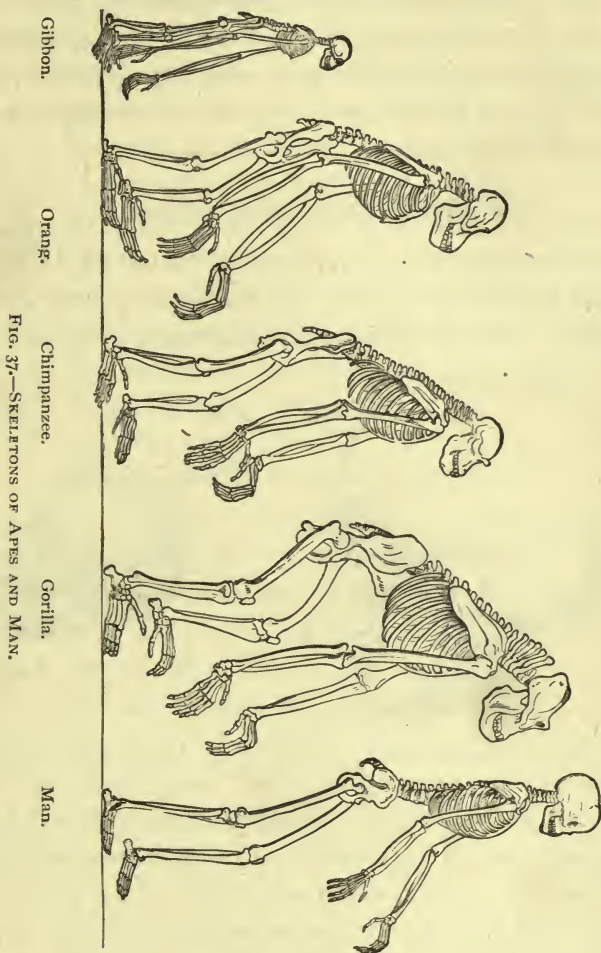
Man is placed in the class *Mammalia*, which includes all those animals which bring forth their young alive, and nourish them with milk secreted by glands of the mother. They also have warm, red blood, and have four chambers to the heart, and a complete double circulation, that is, the blood is sent from the heart to the lungs to be purified, and sent back again to the heart to be distributed throughout the body. This classes man with the monkey, the whale, the lion, the opossum, in fact, with a large proportion of the larger animals of the earth, while it separates him from the fish, the snake, the frog, and the bird.

But man differs so widely from other members of the class mammalia, that he is not classed in the same order with any of them by the naturalists of to-day, but is placed in an order by himself, the order *Bimana* ("two-handed.") This separates him from the apes and monkeys, which nearest resemble man in appearance and structure, these animals being placed in the order *Quadrumania* ("four-handed.") Let us see in what respects man differs from other members of the class mammalia.

THE ERECT POSTURE OF MAN.

He is adapted to an erect posture. The construction of the skeleton and the attachments of muscles are such that it would be difficult and unnatural for him "to go on

all fours." If any one would convince himself of this, let him attempt to run a hundred yards in this way. Compare man in this respect with the monkey or ape. The



monkey *can* walk erect, but with apparent difficulty. Any one would decide in a moment after observing the motions of an ape, that his natural position was on all fours. This, then, is a marked difference between man and the

lower mammals. The advocates of development will admit that man is essentially an erect animal, but they will say that he acquired the habit and power through a long period of time, by being compelled to seek his food, and to dwell on the ground. The fact that the monkey is a partially erect-going animal is evidence of this. In other words he is in a transition stage—a link between man and still lower animals.

COMPARATIVE SIZE OF BRAIN.

The next important difference we notice is the large skull and brain. The brain of man averages $49\frac{1}{2}$ ounces in weight. The brain of an idiot rarely weighs less than



FIG. 38.—HUMAN SKULL.



FIG. 39.—SKULL OF AN APE.

21 ounces. The largest human brain ever weighed, was over 64 ounces. The smallest human brain ever weighed was found to be only 10 ounces (that of an adult woman, as quoted by Gore.) Owen weighed the fresh brain of a gorilla, and found it to be 15 ounces. Very few opportunities for weighing the brains of the higher apes have ever been presented, but we can say that, notwithstanding the rare exceptions of idiots with small brains, there is a vast difference between the human being and the lower

mammals, as to weight of brain. Huxley says: "It may be safely said that an average European child of four years old has a brain twice as large as that of an adult gorilla." More observations have been made in regard to the comparative capacities of the craniums of men and apes, and, consequently, we can draw from them more accurate conclusions. According to Huxley, the smallest human skull contained 62 cubic inches, and the largest gorilla skull contained only $34\frac{1}{2}$ cubic inches.

Another peculiarity of man, as distinguishing him from the apes, is the comparative smallness of the bones of the face, and the regularity in the height of the teeth. Another is that the skin is naked, with few exceptions, or scantily clothed with hair. This is true of no other mammal, except the whale and its kindred.

COMPARISON OF HANDS AND FEET.

The hand of man is a wonderful structure, and though imitated to some extent by the fore extremity of the ape, is vastly superior to it in structure. The difference between the hand and foot of man is great, while the hand and foot of the monkey bear a close resemblance to each other, in both form and adaptability to various actions. The monkey can grasp articles with his foot almost as easily as with his hand. For this reason he is called the "four-handed" animal, while man is called "two-handed." The hand and foot are both relatively shorter than in the apes.

Man is the only animal, except the Siaming gibbon, which has a chin. He has a double curve in his spinal column, which is only approached by the baboon. The lobule of the ear is larger in man than in the apes. The hair of apes and monkeys is most abundant upon the back, while in man it is most abundant upon the scalp.

Man may adapt himself to a greater variety of climatic conditions than any other animal.

Man differs from the apes in the comparative length of the upper extremity; in the cut (fig. 37) it will be seen that the gibbon in an upright position can reach to its foot, the orang to its ankle, the chimpanzee to its knees, but man only about half way down his thighs

The vast differences in intellectual power are sufficiently known. The gap in this respect between the lowest man and the highest ape is indeed a great one.



FIG. 40.—GORILLA.

Man is the only animal capable of expressing thought by articulate speech. Man possesses a moral sense, and is essentially a religious being. It has not been satisfactorily determined that the monkey or any lower animal has anything approaching a moral sense, or exhibits any approach to a manifestation of religious, or even superstitious feeling. (See chapter on "Religions of Men.") Man alone is capable of forming *abstract* ideas.

HIS PROPER SCIENTIFIC LOCATION.

The evolutionist, while admitting the great differences which exist between man and the higher groups of the

lower animals, insist that there is a greater difference between the higher apes and the lower groups of monkeys than there is between the lowest men and the highest apes. Some of them think that man ought to be classed in the same order with the monkey, ape, and baboon. On the other hand, Prof. Owen thought that man differed so much from other mammals, that he should be placed in a class by himself.

Prejudice comes in here to modify men's views of classification. The writer, who has a preconceived notion that man has sprung from the lower animals, will see many points of resemblance and few points of difference between the two. On the other hand, the man who is unwilling to entertain the idea of development, will be inclined to go to the other extreme. But we will be safe in saying that here, as elsewhere, the boundary lines nature has drawn are not clearly marked out, so much gradation does there seem to be among the forms of life.

Belonging to an order by himself, of course he could not be placed in the same genus with any other animal; but, to carry out the plan of classification, man has been referred to the genus *Homo* ("man,") and the species *sapiens* (*wise*,) and, following out the rule for naming animals and plants scientifically by giving the names of the genus and species, man would be called *Homo sapiens*, the name being similar in form to the name of the cat, which is *Felis domesticus*, and the dog, which is *Canis familiaris*. Linnæus, the great Swedish naturalist (born 1707), classed man, the monkey, and the bat in the same order, calling them *primates*. He regarded man as a genus of three species, which he named respectively, *Homo sapiens*, "wise man," *Homo ferus*, "wild man," and *Homo monstrous*, "monstrous man." The second he describes as being dumb, covered completely with hair, and walking on

all fours. The third species he divides into two varieties, the "small-headed" and the "flat-headed." There is no doubt that what he describes as hairy men were apes, and his "monstrous men" were simply cases of deformity.

RACES OF MEN.

Linnæus divided *Homo sapiens* into four varieties or races: The Europeans, with flaxen hair, blue eyes, and light-colored skin; the Asiatic, with blackish hair, brown eyes, and yellowish skin; the African, with black woolly hair, black skin, flat nose, and thick lips; and the American, with tawny skin, long black hair, and beardless chin. But Linnæus was not the first to classify man into races. Bernier, a French traveler in 1772, described four races, which he called the white, the yellow, the black, and the Laplanders. Buffon was a famous French naturalist, born the same year with Linnæus (1707.) He was one of the first to make natural history popular by his rhetorical descriptions and brilliant theories. He did not classify, but described another race, which he called the Malay, and made a distinction between the Hottentots and other negroes. Cuvier admits only three races—the white, the yellow, and the black. Vivey, in 1801, maintained that there were two species of men, each of which he divided into six races, and these again into families. Bory de St. Vincent declared that Adam was the father of the Jews only, and "that the differences between the human races are sufficiently great to merit the designation of species." He raised the number of species to fifteen, each of which included many varieties or races.

St. Hilaire made two classifications. In the first, he makes eleven races, based upon character of hair, flatness or projection of nose, color of skin, shape of eyes, and size of lower extremities. In the second, he divides

them into four races, according to the form of the jaws.

Huxley makes two main divisions, based upon the character of the hair. Thus he has the woolly-haired and the smooth-haired races, each of which is again divided into groups. Dr. Pickering, who traveled extensively, with the object in view of observing varieties of mankind, says: "I have seen in all *eleven races of men*; though I am hardly prepared to fix a positive limit to their number. I confess, after having visited so many different portions of the globe, that I am at a loss where to look for others." He arranges his eleven races in four groups, according to complexion. The white races are the Arabian and the Abyssinian; the brown are the Mongolian, the Hot-tentot, and the Malay; the blackish-brown are the Papuan, the Negrillo, the Indian or Telingan, and the Ethiopian; the black are the Australian and the Negro.

Ernst Haeckel, an enthusiastic advocate of Evolution as applied to the origin of man, divides the genus *Homo* into twelve species, each of which he divides into varieties or races, making in all thirty-six races. He thinks the differences between the races as commonly accepted are as great or greater than the differences between species, as recognized by botanists and zoologists. He quotes Quenstedt as saying: "If negroes and Caucasians were snails, zoologists would universally agree that they represented two very excellent species, which could never have originated from one pair by gradual divergence." It is his belief that man did not originate by development from one ape-like progenitor—but from several distinct, though closely related, ape-like species, which, farther back, had a common origin from still lower forms, and thus he traces man's descent through twenty-two successive stages, from the *monera*, which consisted of "simple homogeneous, structureless, and formless little lumps of mucous or albu-

minous matter (protoplasm,)" down to the state in which we find him at present. The seventeenth stage he calls the pouched animals, like the opossum; the eighteenth stage, the semi-apes; the nineteenth, the tailed apes; the twentieth, the man-like apes; the twenty-first, the ape-like men, and the twenty-second and last stage, the genuine men. He says in regard to the latter: "Genuine men, developed out of the ape-like men of the preceding stage by the gradual development of the animal language of sounds into a connected or articulate language of words."

The illustrious Agassiz admitted eight races in his classification, and advocated the doctrine that man had many geographical origins, yet he did not believe in the development theory as taught by Darwin.

VIEWS ON THE UNITY OF THE HUMAN RACE.

The doctrine of the unity of man's origin, or that all men have sprung from a single pair, is advocated by the majority of those who accept the Bible. Quatrefages is a strong advocate of the unity of the human species, but he does not wish to be classed with those who base their arguments on the Bible. He reasons from a purely scientific basis. He argues for a single species of men, which he divides into three main divisions called trunks, these again into branches, these into boughs, and, finally, into groups. He has attempted to make a natural classification by drawing from all sources in which men resemble or differ. In this regard he has followed the tendency of the naturalists of to-day in classifying any branch of natural history, which is to base classifications on the greatest number of peculiarities. Thus, in classifying men, the stature, color and odor of skin, color and texture of hair, form and proportions of bones, form of limbs and

features, size and form of skull, and even mental traits, and the tendency to certain diseases, are taken as characteristic marks on which to base a classification. Yet so greatly does the species vary, and so intimately do the varieties blend together, that it is impossible to make a classification on which all will agree. Certain nations and tribes of people will be placed in one race by one writer, and by another in a different race.

THE FIVE RACES OF BLUMENBACH.

Though made many years ago, the classification of Blumenbach has been the one most generally accepted. It is the one given in all our text books of geography, and is known by every schoolboy as follows: The Caucasian, European or white race; the Mongolian, Asiatic or yellow race; the Malay or brown race; the Indian, American or red race; and the Ethiopian, African, or black race.

Blumenbach based his classification mainly upon the shape and size of the skull. He placed a skull resting on its base, with the lower jaw attached, and viewed it from behind and above, marking all the peculiarities of outline. Applying this mode of measurement to a large number of skulls of different nations, he formed the five races so generally known, adding to the cranial peculiarities, the distinctions of color, features, stature, etc.

FACIAL ANGLES.

Peter Camper, a distinguished Dutch anatomist, was the first to lay down a method of distinguishing races by comparing the shape and size of the skull. He is the originator of the rule for determining what he calls the "facial angle." He draws two straight lines, one from the opening of the ear to the base of the nose, the other from

the most prominent part of the forehead to the most projecting part of the upper jaw. Camper found in the angles thus formed the distinction, not only between the skulls of different nations, but between those of different animals.. Thus, in the bird, he found the angle to be very small, and become greater in proportion as the animal approached the human figure. One species of ape has a facial angle of 42 degrees, another of 50 degrees, then comes the African with an angle of 70 degrees, while in the European it is 80 degrees. The superior beauty and



FIG. 41.—FACIAL ANGLES.

intelligent expression of the European seems to depend largely upon the size of the angle. The ancient painters and sculptors among the Greeks and Romans were aware of this fact. They represented their ideal men and women as having a facial angle of nearly 90 degrees ; while they represented their gods with faces having angles of 100 degrees.

STATURE AND PHYSIQUE.

Comparing races as to stature, the average-sized men in each race should be taken as typical of the race. As is well known, there are great differences of stature among

men and women of the same race, and even sometimes in the same family. But where a tall and a short race are seen in the same district, the differences of stature will readily be noticed. As an example, compare a group of Chinamen in our cities, with a similar number of white people, the latter will seem to look over the heads of the former. And yet, the differences of average stature is not great in this case—not over four inches. The tallest people in the world are the natives of Patagonia, many of them reaching six feet four inches, and the average being five feet ten inches. The shortest people are the Bushmen, averaging only four feet seven inches. The Laplanders are also a very short race. The tallest races are not quite one-fourth higher than the shortest. This may seem surprising when we do not consult the figures. Ten inches to a man's stature is almost like an inch to the length of his nose. It is said that when Europeans first saw the Patagonians, they described them as a race of giants. Magellan's men declared that they scarcely reached to the waists of the Patagonians. The differences of stature in races of men are not nearly so great as that between breeds of domestic animals, as will be seen when we compare the poodle dog with the St. Bernard, or the Shetland pony with the Norman draft horse.

Races vary considerably in the proportionate length of limbs. The negro is noted for his long arms and legs, and the Aymara Indians of Peru for their shortness. Says Tylor: "Suppose an ordinary Englishman to be altered to the build of a negro, he would want two inches more in the arm, and one inch more in the leg, while to bring him to the proportions of an Aymara, his arm would have to be shortened half an inch, and his leg one inch, from their present lengths."

CAPACITY OF SKULLS.

In comparing capacities of the skull, that of the Australian will contain 79 cubic inches, the African 85, the European 91. The convolutions or folds on the surface of the brain of a European are more numerous and complex than in the brains of Hottentots and Australians.

Looking at the skull from the top downward, three marked types are recognized in the outline presented. Thus, in the European, the diameter from before backward is to the transverse diameter, or that from ear to ear, as 100 to 70; in the negro, 100 to 80; and in the Samoyed, 100 to 85. The first is called the "dolichocephalic" or long-headed; the second, the "mesocephalic" or middle-headed, and the third, the "brachycephalic" or short-headed. Taking a side or profile view of the skull, the Australian and African are "prognathous" or forward-jawed, and the European, "orthognathous" or upright-jawed. The projecting jaw goes with a retreating forehead, and we have the differences of the facial angle produced.

The flat nose and thick lips are characteristic of the negro, but other races have the flat nose also. The European travelers once described the inhabitants of Tartary as having no noses at all, but breathing through two holes in the face.

THE HAIR.

The hair differs widely in different races, in character, color, and amount. The hair of the negro is called wool from its disposition to twist and curl upon itself. The Mongolian and Indian races have hair remarkable for its straightness. If hairs be cut across and examined under the microscope, differences of outline will be seen. The straight hair is almost circular or cylindrical, the woolly

hair oval or flattened. As to amount, there are great differences. The Bushmen have scanty hair; the Crow Indians have hair which sometimes sweeps the ground. Examples of abundance of hair are sometimes seen among women of the white race. The Cafusas of Brazil, a cross between the Indian and the negro, are noted for the abundance of their hair, as shown in the accompanying illustration.

The most common color in hair is black. Black or very dark shades of hair are found with perhaps the majority of



FIG. 42.—CAFUSA WOMAN, BRAZIL INDIAN AND NEGRO CROSS.

lighter-skinned races; but light-colored hair is nearly always accompanied by light-colored skin. Black hair is characteristic of some races, while other races have hair of every variety of shade, from very dark to very light.

COLOR OF THE SKIN.

Color of the skin has always been regarded as a very distinctive mark of race. Color of skin seems to depend somewhat upon the latitude, at least it is a fact that the most of the light-colored races are found north, while most of the darker colored are found in the sub-tropical or tropical

regions. Prichard says that light complexions are found more in mountainous regions, and the dark on the plains. There are so many exceptions to these rules that no law can be laid down. The American Indians are called red, says Topinard, "less on account of this being their ordinary color, than of their dyeing their hair and painting their skin red." Almost all shades of color are to be found among them.

The color of the skin is due to pigment (paint) matter deposited beneath the epidermis, or scarf skin. The latter is transparent when there is little or none of this pigment. The individual has a florid or ruddy complexion due to the blood showing through the walls of the minute blood-vessels. The Scandinavians come the nearest, in this sense, to being a colorless people. No account is to be taken in race distinctions of the Albinos, or so-called abnormal races, as this is shown to be only a disease, or monstrosity. Albinos are individuals who lack the pigmentary matter entirely, and consequently the skin, hair and eyes are colorless, for it is this same pigment which gives color to hair and eyes. The eyes have a red appearance, owing to the blood-vessels showing through. They are found among all races and in every part of the earth, but are not numerous.

The odor of the skin is also a characteristic of races. Negroes and Indians may be known at quite a distance sometimes, by the odor of their skins and the odor of one differs from that of the other. The Indians, it is said, express a dislike of the white man's odor.

The color of the eyes varies much with the color of the hair and skin, dark eyes generally accompanying dark skin and hair. A jet black Negro with blue eyes, or a fair Norwegian with black eyes, would be objects of curiosity.

PREDISPOSITION TO DISEASES.

The predisposition to certain diseases varies greatly with race. Among us the measles is looked upon as a rather trifling disorder, but when introduced among the Fiji islanders it carried them off by the thousand. The yellow fever so fatal to the white race is not so to the Negroes. There is also a difference in temper or disposition among races, some of the brown races being inclined to be sullen, while the blacks of most countries are full of gayety. The great differences of mental power need not be dwelt upon here, as intellectual capacity goes with brain development, and this has been mentioned under other headings.

THE RACES ILLUSTRATED.

THE CAUCASIAN.

To return to Blumenbach's classification, the individuals of the Caucasian, or white race, are usually of tall stature, the facial angle approaching a right angle, the forehead high, the head and face oval shaped, features regular and symmetrical, an abundance of hair which is straight or curled, but never woolly, beard generally inclined to grow long, the skin usually fair or ruddy, but tawny or swarthy in the Arabs, Hindoos, and some others. The hair is of different shades in different individuals, even in the same family, and may vary



FIG. 43.—CAUCASIAN.

from jet black to brown, red, yellowish, blonde or flaxen. The eyes also vary in color, and are set straight, or hori-



LADY OF CAIRO (MODERN EGYPTIAN), WHITE RACE, ARAMEAN BRANCH.

zontal. The nose is usually prominent but not broad, and the lips are only moderately full. The body is well proportioned and the brain averages larger than in any other race.

The principal population of Europe and the United States, the inhabitants of India, Arabia, Western Asia and Northern Africa, belong to this race. The Arabs, the Jews, the Moors and the Abyssinians may be grouped together as a sub-race distinguished more particularly by language. They are sometimes called the Semitic races. The ancient Egyptians are also classed with the Semitic races,

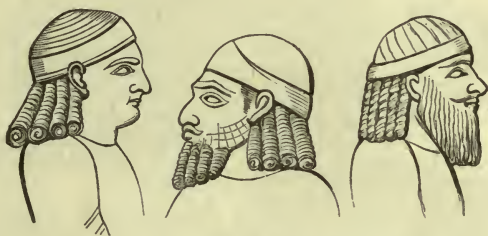


FIG. 45.—BABYLONIAN WOMAN AND MEN.

as are also the ancient Assyrians, Babylonians and Hebrews.

The second great sub-race on this basis, is the Indo-European. It includes the Hindoos, Persians, and nearly all the people in Europe, with their descendants in America. The inhabitants of the region of the Caucasus Mountains, especially the Circassians and the Georgians, were thought by Blumenbach to be the most perfect, in a physical sense, of this race, hence the name Caucasian, but some later writers have excluded them entirely, and placed them in the Mongolian race. Dr. Latham thinks Blumenbach based his theory of classification on very narrow grounds when he named the highest race from these people.

The ancient Greeks and Romans belonged to the Caucasian race. The statuary left by their great sculptors are the most perfect examples of symmetry of form, and



FIG. 46.—PEOPLES KNOWN TO ANCIENT EGYPTIANS.

grace, and beauty of figure. Among the individuals of this race, we find the most perfect types of beauty, strength, physical and intellectual power, and of harmonious pro-

portion of all the parts which make up a human being. The typical Caucasian, then, may be considered the typical man, and all others as departures from this type.

The believer in evolution will say that all these variations from this typical form are only various stages of a progressive development toward the higher type. The advocates of special creation will say that they are variously degenerated forms, Adam and Eve being the original perfect types of humanity. This is as much as to say that man has either *descended* from a perfect type, which was created in the beginning, or he has *ascended* from a lower and less perfect form, and is still on the upward road of progress toward a still higher type than any we have yet seen.



FIG. 47.—ROMAN SOLDIER.

In intelligence and civilization the Caucasian race takes the lead. They have pushed their conquests and colonies into every part of the globe, and are in every sense the dominant race.

Dr. Pickering classes the most of the individuals of this race as the Arabian or white race, but places the Abyssinians in a race by themselves. He describes the latter as having European features, with crisped or frizzled hair, and complexion, which, though often very light, is never florid.

THE MONGOLIAN RACE.

The individuals of the Mongolian race are distinguished by short stature, round heads, wide faces, relatively high cheek bones, the eyes narrow and often set obliquely, the nose rather small and broad at the lower



FIG. 48.—MONGOLIAN.

part, the lips thin, hair coarse and uniformly straight, with a tendency to grow very long; beard scanty or none, complexion yellowish, varying somewhat with the climate, being lighter in regions farther north. The type is found in the plateau of Mongolia in Central and Western Asia. Pickering places the North American Indians in this race.

He says a general peculiarity of the Mongolians is the feminine aspect of both sexes, which does not depend wholly upon the absence of beard.

This race is distributed over the whole of Eastern Asia, except India. It includes the Chinese, the Japanese, and the Siamese, who have a considerable degree of civilization, as well as the semi-savage tribes which wander over Central and Western Asia, as the Tartars and Mongols. The Eskimo of the northern coasts of North America are usually classed with this race, but Prichard and some others regard them as belonging to the American or Indian race. They differ in many respects from the typical Mongolian, yet seem to be nearer like them than they are like the type of any other of the five races.



FIG. 49. YOUNG ESKIMO.



. YAKUT VILLAGERS, MONGOLIAN RACE, TUNGUSIAN FAMILY, (SIBERIA.)

The Laplanders and Finns of Northern Europe also belong to this race. The Turks are usually classed with the Mongolians, but Pickering describes them as belonging to the Arabian or white race.

In general intelligence, civilization, and intellectual power, the Mongolians are inferior to the Caucasian race. The Chinese and Japanese, however, have attained a peculiar civilization, and in some arts they may be considered superior to the average European.

THE AFRICAN RACE.

Members of the Ethiopian or negro race are known by their dark skin, varying from a jet black to brown or dusky, their short woolly hair, prominent jaws, thick lips, retreating foreheads, head full back of the ears, broad, flat nose, general ungainly form. This race varies much in itself, and many authorities make several races of it. In average mental power it takes the lowest rank. The typical men of this race are found mostly in Central Africa. The negroes of the United States are the descendants of the slaves brought from Africa about two hundred years ago, but more or less modified by admixture with the Caucasian race. The Caffres, Hottentots, and Bushmen of Southern Africa are variations from the type.



FIG. 51.—NEGRO.

The races just described are pretty well defined, and are called by Guyot primary races; the two following being rather modifications of these, he calls secondary races.

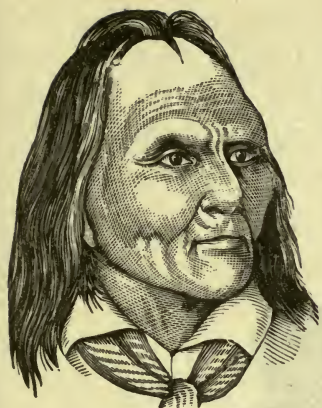


FIG. 52.—INDIAN.

The American or Indian race resembles the Mongolian, but the head is less round, the face narrower, the eyes not oblique, the nose prominent, and the skin of a reddish or copper color. This race occupied nearly the whole of the American continent at the time of Columbus' discovery. The ancient Mexicans and Peruvians exhibited at one time a high state of civilization, but differed very little in physical character from the ruder in-

habitants of the remaining portions of the continent.

The Malay race resembles the Mongolian also, but has thicker lips, hair less straight, generally full beards, and a brown complexion. They are found mainly occupying the Malay peninsula and the islands of the Pacific and Indian Oceans.

The natives of Australia seem to be peculiar to that continent, like the vegetation and animal life. They have many of the characteristics of the African race, yet differ from them in important particulars. They seem to be a cross between the African and Malay



FIG. 53.—MALAY.

racés. Their hair is not woolly like the Negro, but fine and wavy, the lips are not so thick, nor the nose so much flattened, but the color of the skin is as dark. Pickering makes them a distinct race, but groups them with the



FIG. 54.—AUSTRALIAN WOMEN.

Negroes as black races. Tylor says they may be taken as a special type of the brown races. They are considered, or some branches of them at least, as the lowest races of mankind.

Fig. 55 represents a Mexican Indian and is referred to by Quatrefages as belonging to the Red Race, Northern Branch, a division which he says is rather imperfect from an ethnological point of view, its characters being a mixture of the yellow, white and black races.

The estimated number of individuals of the human species is 1443 millions. This number is distributed



FIG. 55.—MEXICAN INDIAN.

among the five races about as follows: Caucasians, 600 millions; Mongolians, 589 millions; Ethiopians, 185 millions; Americans, 11 millions; Malays, 55 millions.

The question as to the cause of the difference of race among men is one difficult of solution. The differences both of kind and degree are indeed great. Contrast a Humboldt, a Newton or a Shakespeare with a native of Australia or a Bushman of South Africa. It will require no stretch of the imagination to conceive of the former as

being only a little lower than the angels, and the latter only a little above the brute. But in history we see nations pass through upward and downward grades. We see a people rise through a succession of generations from barbarism to civilization, and again we see them degraded from a civilized state to one of utter barbarism, and finally



FIG. 56.—MALAY RACE, NEW ZEALAND CANNIBAL

die out because unable to battle with the forces of nature or to resist the encroachments of fellow strugglers in the field. Where to-day, is the civilization of the ancient Egyptians? Where are the descendants of those who shone in the halls of the Montezumas? On the other hand we may trace our own American and English civilization back to the rude Saxons, Britons, Normans and Danes.

INFLUENCE OF CLIMATE ON MAN:

Climate has doubtless something to do with modifying the physical and mental characters of man, yet I think, not so much as generally supposed. We find under the most opposite conditions of climate, races which closely resemble in physical characteristics, and on the other hand races differing widely dwelling under the same or similar



FIG. 57.—ANTIS INDIAN OF PERU. RED RACE, SOUTHERN BRANCH (FIGUIER).
CLOSELY RESEMBLING THE YELLOW RACE.

climatic conditions. Writers are inclined to think that physical conditions of life, as climate, food and habits of living have been largely instrumental in causing the various races to diverge from the original stock, and when races were once formed, crossing of the stocks, together with new conditions of life, formed new races, which were perpetuated by hereditary descent. But the proofs are wanting to establish any satisfactory theory of the cause

of the variation of the species. The doctrine of Natural Selection throws more light upon the origin of races than any theory yet advanced. A belief in Natural Selection, it must be remembered, is not necessarily a belief in the origin of man from the lower animals. It does not follow that because varieties are produced from one species, one species may be produced by Natural Selection from another species.

As an appropriate close to this chapter, I quote the following from the eminent French Naturalist, de Quatrefages :

“The primitive type of the human species must necessarily have been effaced and have disappeared. The enforced migrations, and the actions of climate must of themselves have produced this result. Man has passed through two geological epochs; perhaps his center of appearance is no longer in existence; at any rate the conditions are very different from those prevailing when humanity began its existence.”



EGYPTIAN LIGHT TROOPS.

CHAPTER II.

THE LANGUAGES OF MEN.

‘ Language is one of the most marked and conspicuous, as well as fundamentally characteristic of the faculties of man.”—*William Dwight Whitney.*

Language may be defined as the means of expressing thought or feeling for the purpose of communication. This expression of thought and feeling may take various forms, as gestures, grimaces, or facial movements, sounds, either inarticulated or articulated, pictures, and written signs. It is not a prerogative of man alone; animals have a language, defective and crude though it be, compared with that of man. But man alone has *articulate* language. He alone uses words to express his thoughts and feelings. True, certain animals have the power, and have been taught, to articulate words, but they make no use of them for purposes of communication. The parrot may say, “Polly wants a cracker,” when it is hungry, but it does not comprehend what those words mean, although it may know that a repetition of them will bring the desired food. Were it taught to say, “When Johnny comes home,” or “The Union forever,” and the repetition of these words were followed by presentation of food, the parrot would use them for the purpose of asking for food. We cannot say, then, that the parrot *uses* articulate language.

Man is also alone in the possession of a pictured or written language. Animals communicate with each other

only by inarticulate sounds, gestures, and grimaces. Prof. Whitney does not wish to classify the sounds and gestures of animals by the name of language, although he admits their power of communication with each other. He defines language as "the means of expression of *human* thought ;" and says, "Moreover, man is the sole possessor of language."

ORIGIN OF LANGUAGE.

In regard to the origin of language, little can be said. The question is almost identical with the question of the origin of man. There are two principal theories. The one is, that language was a special creation—a special gift of God. Says Archbishop Trench ; "God gave man language, just as he gave him reason, and just because he gave him reason ; for what is man's *word* but his *reason*, coming forth that it may behold itself ? They are indeed so essentially one and the same, that the Greek language has one word for them both. He gave it to him because he could not be man, that is, a social being, without it. Yet this must not be taken to affirm that man started at the first furnished with a full-formed vocabulary of words, and, as it were, with his first dictionary and first grammar ready-made to his hands."

The other theory is identical with the evolution theory of the origin of man. Language was a gradual development from the crude, inarticulate sounds of the brute. While I see no good argument in favor of this theory, the fact that all nations and tribes, however low in the scale, have an articulate language, is no argument against it, for it is evident that language was one of the very earliest acquirements of man. He had language before he had tools, as was shown in a former chapter, and one can see how the acquirement of a language would be the means of rapid advancement in knowledge.

NECESSITY OF LANGUAGE.

How rapidly would man degenerate, if to-day he were deprived of the power of speech. Says Huxley: "What is it that constitutes and makes man what he is? What is it but his power of language—that language giving him the means of recording his experience, and making every generation somewhat wiser than its predecessor, more in accordance with the established order of the universe. What is it but this power of speech, of recording experiences, which enables men to be men—looking before and after, and, in some dim sense, understanding the working of this wondrous universe, and which distinguishes man from the whole of the brute world." He then goes on to show that this great functional difference between men and lower animals is dependent upon slight differences in the structure of his organs, and that it would be no great step to modify the vocal organs of an animal so that it would be capable of uttering speech, and this speech, once acquired, would be the great means of developing ideas, and thus increasing brain capacity and mental power.

Prof. Max Mueller, the great German linguist, however, does not talk so favorably of the evolution of language. He says: "We see that the lowest of savages—men whose language is said to be no better than the clucking of hens or the twittering of birds, and who have been declared in many respects lower than even animals, possess this one specific characteristic, that, if you take one of their babies, and bring it up in England, it will learn to speak as well as any English baby, while no amount of education will elicit any attempts at language from the highest animals, whether biped or quadruped.

* * * * Language is something more palpable than

a fold of the brain, or an angle of the skull. It admits of no cavilling, and no process of natural selection will ever distill significant words out of the notes of birds, or the cries of beasts."

But while Prof. Max Mueller does not favor the idea of language having originated from an improvement upon the sounds of the brute, he does not believe that it was a special divine gift, but thinks that it advanced from very crude beginnings. After observing the fact that, though the languages of civilized nations have an immense number of words, the number of original, or root words is very small, he says :

"This fact simplifies immensely the problem of the origin of language. It has taken away all excuse for those rapturous descriptions of language which invariably preceded the argument that language must have a divine origin." There is nothing startling in these statements, for as Sir John Lubbock observes, "Those who regard language as a revelation, do so in the teeth of the express statement in Genesis that God brought the animals 'unto Adam to see what he would call them; and whatever Adam called every living creature, that was the name thereof.'" S. H. Key, in a work on the origin and development of language says that "the Mosaic account expressly assigns the immediate invention to Adam."

SPECIAL THEORIES OF THE ORIGIN OF LANGUAGE.

Among the special theories of the language of primitive men the following may be noticed :

Max Mueller, following Prof. Heyse, thought that with each conception or idea acquired by man there was given by creative power a special phonetic expression.

He says : "Man in his primitive and perfect state, was not only endowed, like the brute, with the power

of expressing his sensations by interjections, and his perceptions by onomatopœic (imitative sounds); he possessed likewise the faculty of giving more articulate expression to the natural conceptions of his mind. That faculty was not of his making. It was an instinct of the mind as irresistible as any other instinct." This is as much as to say, that when the primitive man was "struck by an idea," he was at the same time struck by a sound or combination of sounds with which he could express that idea. This theory has been severely criticised by Prof. Whitney of Yale College. It has been called in derision the "ding-dong" theory, and is now generally discarded by scholars, Mueller himself no longer advocating it.

Prof. Noire tried to account for language by a development from interjectional or emotional cries. Max Mueller calls this the "pooh-pooh" theory.

Kaltschmidt and others thought that the first language was altogether onomatopœic, or imitative of natural sounds. It is indeed true, that many of our words in common use can be traced to this origin. Thus the words buzz, whizz, bang, clash, crack, etc., have a resemblance in sound to the noises they represent. All languages contain these imitative or onomatopœic words. In the Egyptian language a donkey was called *eo*; in the Chinese a cat is called *mau*; in the Australian a fly is *bumberoo*; in the Botokudo language a gun is *pung*; in the Tecuna language of Brazil the verb to sneeze is *hairschu*; the Welsh verb for the same is *tis*; in the Sanskrit a drum is *dundu*. It is easy to pronounce these words so as to imitate the sounds of the respective animals, or those made by the respective instruments and actions.

Sir John Lubbock gives a long list of English words which seem to have originated in natural sounds, and inclines to this view of the origin of words.

It must be remembered that words change in course of time by use, and that many words, which as we find them are not onomatopœic, may have been so originally. Prof. Max Mueller calls this theory the "bow-wow" theory, but Prof. Mallery says: "Its advocates might derive an argument from the epithet itself, as not only our children, but the natives of Papua, call the dog a *bow-wow*."

AID OF GESTICULATION.

Prof. Sayce of Oxford, England, a distinguished linguist, "believes that there was a time in the history of speech when the articulate or semi-articulate sounds uttered by primitive men were made the significant representations of thought by the gestures with which they were accompanied." Prof. Mallery agrees substantially with this view, and says: "The preponderance of authority is in favor of the view that man, when in the possession of his faculties, did not choose between voice and gesture, both being originally instinctive, as they both are now, and never, with those faculties, was in a state where the one was used to the absolute exclusion of the other. * * * With the voice man at first imitated the few sounds of nature, while with gesture he exhibited actions, motions, positions, forms, dimensions, directions, and distances, and their derivatives."

The writer of the article on Language in Chambers' Encyclopedia says: "Everything, in fact, tends to show that language is a spontaneous product of human nature—a necessary result of man's physical and mental constitution (including his social instincts), as natural to him as to walk, eat or sleep, and as independent of his will as his stature, or the color of his hair."

ORIGIN OF CONSONANTS AND ROOTS.

Richard Grant White says in regard to the origin of language: "Man first uttered formless vowel sounds, as now in early infancy or in idiocy, that prolonged infancy of the mind, he utters only such sounds. These sounds were not language hardly more than the cries of beasts are language; but still, being uttered by an intelligent creature, capable of discourse of reason, they had *some* significance. The vowel sounds were in the course of time interrupted, modified and supported by consonants, without which vowels cannot be put to much intelligent or significant use. Vocal utterance, thus made articulate, had of course differences; and those differences came naturally and inevitably to be associated with things, with feelings, and with thoughts; indeed, were born of such association. Thus roots were formed. These roots were combined and modified as circumstances required, and in this way original language, or perhaps languages, came into being. When this took place, who would venture even to conjecture?"

LANGUAGE AN EVIDENCE OF CIVILIZATION.

Those who hold that all savage nations have degenerated from a more civilized state, find no argument from the side of language, for if a people had been once civilized, certain *words* which their civilized state had produced would remain in use, more or less perfect, in their degraded state, or at least show traces of their original form and meaning. Thus a language once formed is hard to kill. It may degenerate, but it will always retain traces of its original form. This is verified in cases where we know from history that the people have degenerated.

THE USE OF SIGNS AS AN AID TO LANGUAGE.

It may be truly said that the lower we go in the scale of civilization, the simpler the language. Among the lowest races, the articulate sounds are few and simple, and gestures help greatly in expressing their thoughts. This habit of using signs to enlarge and extend communication of thought is probably not altogether because of the lack of articulate sounds, but has arisen as a consequence of the fact that the number of different languages among savage peoples is very great, and a sign language would, therefore, be very convenient in the communication of one tribe with another. Thus the various tribes of Indians which once inhabited North America, had different languages, and we are told by travelers that the members of one tribe would converse freely with those of another tribe by means of signs. It is a well-known fact, also, that the traders and hunters of our Western borders frequently converse with the Indians almost altogether by means of signs, and so common is the practice that the hunters and trappers fall into the habit of using signs, and converse with each other largely in this manner, and even unconsciously accompany their spoken language with many gestures.

The Bushmen of Africa, it is said, use so many signs in conversing, that they can not understand each other in the dark. This is said to be true, to a great extent, also, of the Arapahoes of North America, who, "to make a stranger understand them, must always repair to the camp-fire."

Among civilized people, where there are many dialects in the same country, gesture language is much used. The Italians, "dwelling in a maze of dialects, and subject for centuries either to foreign rule or to the influx of

strangers on whom they depended," are especially noted for their profuse use of gestures. The people of Germany and France are also noted for their habit of gesturing in conversation, the habit having become national traits, no doubt, because of the profusion of dialects, and the fact that many times in their history they have been under arbitrary rule—free speech being a crime.

The people of the United States use, perhaps, the fewest gestures, for the reason that speech has been as free as water, and they speak a common language, kept from breaking up into separate dialects by the free intercourse and travel between the people of one section and another. Dialects grow up where the great majority of the people are born, live, and die in the same community, and do not mingle with strangers. This is not the case in this country, comparatively few persons growing up and living to old age in the community in which they were born.

Whether the primitive language of men was altogether a language of signs will, perhaps, never be satisfactorily determined, but it is a significant fact that the lower we go in the scale of civilization, the more frequent the use of signs. It may be observed even among the people around us that, as a rule, intelligent persons employ fewer gestures in conversation than the ignorant and unlettered. Children, also, before they have learned to articulate distinctly, use many gestures in making their wants known. If it be a law that "the order of development of the individual is the same as that of the species," this fact is full of significance. It is the more significant when we remember that children are not taught to use signs, but great efforts are made to teach them articulate language. It may be mentioned, also, in this connection, that children sometimes invent words to express their ideas, as in cases given by Prof. Bell and Garrick Mallery. Bell tells of an

infant which, to express his satisfaction with a certain article of food, gave the combination of sounds represented by the letters "nyum, nyum;" and Mallery cites the case of a little girl, a friend of his, who, in a letter describing a feast, used the same word, with nearly the same spelling; and he adds that the Papuan savages call eating, "nam-nam."

Sign language would seem to be the original and natural language of man, also, from the fact that persons who are born blind, deaf, and dumb use gestures and facial expressions. In this case they could not learn them by imitation.

The remarkable facility with which deaf mutes express themselves by means of signs, is well known. Many of them become well educated. Persons who, by long solitary confinement, or who have in other ways become isolated from their fellow-beings, and have lost entirely the power of speech, are still able to communicate to a considerable degree by means of signs.

Stammerers and persons with a limited knowledge of another language, instinctively use gestures, to help them along. Again, all persons use involuntary gestures. This tendency seems to be inherited from our remote ancestors.

Seven Ute Indians were once taken to the Deaf Mute College at Washington City, and, in order to test their knowledge of signs, they were asked to talk to the mutes. This they did with a great deal of ease, the mutes relating anecdotes which were understood by the Indians, and related again by them to their interpreter who interpreted them to the officers of the college. The Indians also gave narrations which were understood by the mutes.

E. B. Tylor, speaking of sign language, says: "Such a way of communication is so natural all the world over,

that, when outlandish people, such as Laplanders, have been brought to be exhibited in our great cities, they have been comforted in their loneliness by meeting with deaf and dumb children, with whom they at once fell to conversing with delight in the universal language of signs."

It must be remembered in this connection that the scientific study of languages and especially the languages of savage nations, is only in its infancy. The future, perhaps, will give us a philosophy of language and throw some light upon its origin. Many eminent scientists are now at work in this department, and it is to be hoped that some satisfactory conclusions will eventually be attained.

GROWTH OF LANGUAGE.—EXPRESSIONS FOR NEW IDEAS.

The use of language is to express ideas. As man progresses in the intellectual scale the number of ideas increases. Words are signs of ideas. Naturally we should think that in any language the number of words would increase with the number of ideas, but this is not strictly true, the number of ideas increasing much more rapidly than the number of words. This happens because the words already in use are combined and modified so as to express new ideas.

Some of the ways in which words are thus combined and modified, I shall here notice. The Chinese have a way of placing two words together without joining them into one word, yet in this position they have a meaning different from what they have when standing alone. In our English language and in many others, more especially the German, two words are compounded, or joined together, to express a different idea. Thus we have black-board, staircase, bootjack, penknife, and hundreds of others in English. The Germans call a towel a hand-cloth, a glove a hand-shoe, a thimble a finger-hat, an

umbrella a rain-screen, a parasol a sun-screen, and thus one might mention scores of words which are compound in German, but simple in English.

Then there is a combination by what is called agglutination, or where two words are compounded and one of them is more or less changed in form. As examples, take the word holiday, composed of holy and day, and truthful, made up of truth and full. Sometimes words are compounded so that one or both of the original words are so changed as to be scarcely recognized. This is caused by the tendency to economize speech, certain sounds or parts of the word being in the course of time dropped. Many of these combinations were originally made for inflection, that is to express differences of time, number, person or sex, and the added words being too long to speak easily were shortened by dropping part or blending the sound with the root word. As an example, the word *did* was probably added to verbs to express past time; as present, love, past, did love, or love-did, which was contracted to *loved*, our present word.

Another manner of forming new words out of old ones is by changing one or more of the vowels, as *men* from *man*, and *run* from *ran*. Thus words expressing different numbers, tenses, etc., are produced. This method is rather uncommon in the English language but prevails largely in the Hebrew.

ORDER OF WORDS AND INTONATION.

In some languages, and more especially the Chinese, different ideas are given to the same word, or rather different words are formed from one word by simply giving it a different intonation. In Chinese eight distinct intonations are found, by the use of which one word may be made to express eight different ideas. We do not in

English form new words in this way but the use of the rising inflection in asking a question, and the emphasis we sometimes put upon some words of a sentence to change the meaning, are approaches to this principle.

The position of a word in a sentence may change the meaning and significant use of the word. Thus we say: "Mary goes to school," and we get the idea of the girl as the actor and moving toward the place where the school is kept, but should we transpose the words and say: "The school goes to Mary," we see at once a different idea. Thus with the same words a number of different ideas may be expressed by simply varying their relative position.

THE NUMBER OF WORDS IN A LANGUAGE.

Thus we see how from a comparatively few original or root words the many words which belong to a language are produced, and how a great variety of thoughts may be expressed by comparatively few words. The number of words in civilized languages is, however, very great. Webster's dictionary contains 118,000 words, and as Whitney observes: "If we were to count in our words only those degrees of difference of meaning for which in other cases separate provision is made, the 100,000 English words would doubtless be found equivalent to a million or two." But the number of root, or original words from which the great majority of these have been derived is very small; perhaps four or five hundred would not be too low an estimate. In the Chinese the number of root words is 450, in the Hebrew 500.

PICTURE AND WRITTEN LANGUAGE.

In classifying languages, we need not take into consideration the language of signs, nor that of inarticulate cries,

as these seem to be common to savages and deaf mutes everywhere, and as aids to articulate language among all peoples. Language, then, may be divided into spoken and written. All races above the savage have both spoken and written language, more or less perfect in form. The savage races, except, perhaps, the very lowest, communicate occasionally by means of written signs or pictures. There are, however, according to some accounts, many savages who can not comprehend even a picture, much less an arbitrary sign. On the other hand, there are some very low tribes who can make drawings and carve images of animals and other objects quite creditably. It must be remembered in this connection that the ability to draw pictures and to form the letters of ordinary writing varies much, even among civilized people. It comes quite natural for some children to draw and paint, and they learn to write readily, while others learn these arts with great difficulty, and never become proficient. The Chinese may be said to be civilized in many respects, and have acquired great skill in certain arts, yet are very deficient in drawing, having scarcely any idea of perspective.

It was a great step upward when men learned to communicate with each other by means of written symbols. A missionary in the South Sea Islands relates how he once, while doing some carpenter work, and having forgotten his square, wrote a message for it upon a chip, and sent it to his wife by a native, who was greatly astonished to find that the chip could talk. He carried it around his neck, tied to a string, for a long time afterward, and would tell his countrymen what the chip could do.

The Peruvians recorded events by means of a cord, about two feet long, to which were tied a number of different colored threads, which were tied in knots. The knots and colors represented certain ideas. This knotted

cord was called "quipu," or "quippu." The Chinese formerly used something similar to this in transacting business. It is said certain tribes in Africa and America also have used these knotted cords. Lubbock suggests that the custom some people have of tying a knot in a handkerchief (and I would add of tying a string around a finger) to assist the memory, is a relic of this ancient and primitive method of recording thought.

The first writing was undoubtedly of the simplest kind, and that is the drawing of pictures to represent the objects concerned in the story to be told, their relative positions, perhaps, aiding the thought. A step beyond this is where

a certain animal or object is pictured to represent something else, that is, used as a symbol or emblem, as when a land turtle is pictured to represent land, or a bear, or other animal to represent the name of a certain chief, as is frequent in the picture-writing of North American Indians. The

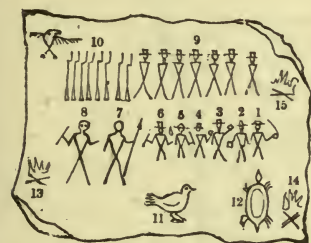


FIG. 58.—INDIAN BARK LETTER.

accompanying cut represents an Indian bark letter. It is explained as follows. The letter was attached to a pole pointing in a certain direction, and was intended to give information to other Indians who might pass that way, that a party of explorers, with two Indian guides, had passed that point in the direction indicated by the leaning pole: No. 1 represents the officer in command of the party. His sword indicates that he is an officer. No. 2 represents the secretary, as shown by the book in his hand. No. 3 denotes the geologist who accompanied the party. He is represented by the hammer in his hand. Nos. 4 and 5 are assistants; No. 6 is the interpreter; Nos. 7 and 8 are the two Indian guides. They are known

to be Indians because they wear no hats; this being a common way of distinguishing Indians from white men. Nos. 9 and 10 represent the seven soldiers with their muskets. The figures of animals indicate the game they had captured, and Nos. 13, 14, and 15 being the representations of fires showed that they cooked the game at the encampment, and also the number of separate fires.

The above may be taken as a fair example of simple

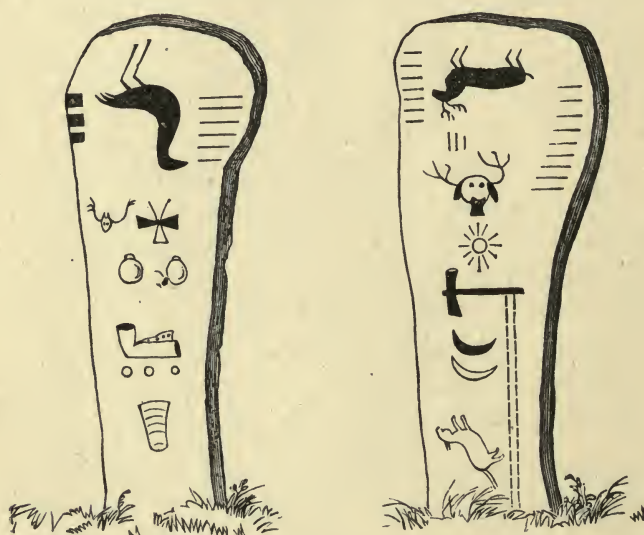


FIG. 59.—INDIAN GRAVE POSTS, (SCHOOLCRAFT.)

picture and symbol-writing. The next step was where pictures were made to represent sounds, or phonetic writing. A rebus is really a relic of this ancient picture phonetic-writing. Thus, if one draws the picture of a man and the picture of a date fruit, it will represent in rebus the word *mandate*.

Another example of picture and symbol-writing is shown in the accompanying figures of the grave-posts of Indian chiefs. The animals represent the tribe or clan

to which the chiefs belonged, as the families of the Crane and of the Reindeer. The figure on the left is the grave-post of a noted chief of the St. Mary's tribe, who died on Lake Superior in 1828. The figure of the crane represents his family, the crane being the adopted symbol. Its being inverted represents death. The strokes on the right and left are so many marks of honor. The figure on the right is the grave-post of Wabojee, a celebrated war-chief, who died on Lake Superior about 1793. His family was symbolized by the reindeer. The seven marks on the left are seven war parties which he led. The three vertical marks below the reindeer represent three wounds received in battle. The moose's head below represents a terrible conflict he once had with this animal.

ORIGIN OF LETTERS.

The letters of all alphabets were first, no doubt, real pictures of objects, but by frequent use became modified until they no longer resembled the original pictures. In the Chinese language a single character represents a word. These characters have a very meaningless look to us, but when they are placed by the side of early Chinese characters, which were real pictures of such objects as sun, moon, mountain, tree, dog, etc., the resemblance is quite apparent. As noticed in the chapter on Prehistoric Man, many of the letters of our own alphabet may be traced back to the pictures of animals and objects.



FIG. 60.—EGYPTIAN
HIEROGLYPHICS.

Hieroglyphics (literally "sacred sculptures,") was a term applied to the characters employed by the ancient Egyptians and Mexicans in writing. This system represented both the mere picture language and the picture-phonetic, that is, some of the characters were pictures which stood for ideas, and other

pictures or marks represented sounds. For example, the picture of a dog represented directly the idea, "dog,"; or a picture, as of a fox, might represent an abstract idea, "cunning"; and a picture of a heron would represent the sound "Ba," an owl, "Mu," etc. The system of hieroglyphic writing was very complicated as there was no definite order of writing the words.



FIG. 61.—HIEROGLYPHICS OF THE NAME OF EGYPT.

ORIGIN OF ALPHABETS.

It was another step in advance when simple characters were made to represent sounds, and this was the beginning of an alphabet. The Phœnician alphabet is supposed to have been the first, and from it were derived the Greek, the Latin, the Arabic, and other alphabets. As many as 400 alphabets have been enumerated, including both those of ancient and modern times, but many of these differ so slightly from each other that the number may be reduced to about 50.

The elementary or simple sounds in any language are comparatively few in number, and a people once in possession of a system of easily-formed characters, by which they could represent these sounds, either by single characters or by a combination of them, could make rapid advancement in writing, because by combining characters to represent words with more than one sound, they could readily communicate by writing all the ideas in their possession.

The ancient Assyrians and Persians wrote in what are called cuneiform, or wedge-shaped characters similar to arrow-heads or spear-points. These characters are partly phonetic and partly ideo-graphic, that is, some of them stand for sounds or syllables, and some for objects

directly. It is difficult to see how these curious wedge-shaped characters could have originated from pictures, but it is the opinion of some that they were so derived.

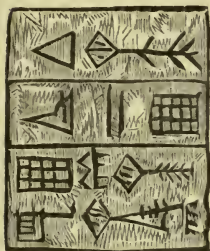


FIG. 62.—CHALDEAN BRICK
WITH CUNEIFORM CHAR-
ACTERS.

Although the invention of writing marked a great stride in the advancement of mankind, the invention of printing marked a greater one, for before books were printed, the labor of copying them was so great that only the rich could possess them, and while writing preserved records and enabled a few men to take advantage of the knowledge of past generations, printing has now brought these advantages within the reach of all. But printing is only a more rapid method of writing, and need not be mentioned otherwise than incidentally in this connection.

NUMBER OF LANGUAGES AND DIALECTS.

There are about 900 languages and 5,000 dialects known. By dialects we mean local forms of language or branches of a language, where the forms are mainly the same, but differing in minor particulars. Thus, while the people of Great Britain and Ireland speak the English language, they do not all speak it exactly alike, the peculiarities being either (1) in different pronunciations of certain words, as the Irishman would say *bowld* for bold, and the Scotchman *bauld*; (2) in different grammatical forms, as in some parts of Scotland and England the plural of eye is *eyen* or *een*; or (3) in the use of different words, or what are known as provincialisms, as the Scotch say for child, *bairn*.

The dialects of civilized people are not usually written, except where a poet or novelist uses them for the purpose of illustration, or to preserve them as literary curiosities,

or for the sake of humor. There is always what may be called the standard of correct speech, which is simply the usage of the best speakers or writers, or the more cultured class of people. The rules of correct speech according to this standard systematically arranged, constitute the science of grammar.

A few words of explanation as to how the Hieroglyphics and Cuneiform characters were deciphered are in order here. During the French invasion of Egypt, in 1798 and '99, a stone was found at Rosetta which contained an inscription in three languages, Greek, Demotic, and Hieroglyphic. It was naturally supposed that the inscription was the same in all. The occurrence of certain Hieroglyphics in oval inclosures led to the supposition that these inclosed words might be royal names. As the names of *Ptolemy* and *Cleopatra* appeared in the Greek a clue was thus obtained which led to the correct deciphering of the whole.

The *Behistun Inscription* was carved by order of Darius Hystaspes (King of Persia, about 500 B. C.,) on the side of a mountain in Media, 300 feet from the base. The inscription was in *Persian*, *Median*, and *Assyrian*. Sir Henry Rawlinson at the risk of personal danger, scaled the mountain and copied the writings. The Persian being deciphered, furnished a key to the numerous ancient Assyrian inscriptions.



CHALDEAN BRICKS WITH CUNEIFORM CHARACTERS.

CHAPTER III.

STRUCTURE OF LANGUAGES.

The principal languages of the earth have been divided into three great divisions or orders, the *Monosyllabic* or *Isolating*, the *Agglutinate*, and the *Inflectional*.

Of the Monosyllabic, the Chinese is taken as typical. It includes also the languages of Siam, Anam, and Burmah. The Chinese is called a Monosyllabic language, because the words consist each of one syllable, that is, may be uttered by a single impulse of the voice. Each word expresses a complete idea. There are only about 450 original or root words, but by varying the accent and emphasis, as many as 1,200 are formed. The relations of words are shown entirely by their position in the sentence. When they wish to denote differences of sex or number, they do not modify the words, but add another word, as for people they would say, *multitude man*; for son, *man child*; for daughter, *woman child*.

Their written language consists of as many as 50,000 different signs or characters, each representing an idea. The number of words represented in writing is about ten times greater than those recognized by the ear, because there are many words similar in sound, but different in meaning; and in writing each meaning of the word has its own appropriate symbol or character.

Thus, it will be seen, to become a scholar in the Chinese language, one must know and remember several

thousand distinct letters or characters. The profoundest scholars among them are not able to master more than ten or twelve thousand of these characters.

The Japanese spoken language differs from the Chinese, as it is agglutinate or polysyllabic, and has not the system of intonation; but the written language is of two kinds, one resembling the Chinese; the other of more recent invention, consists of a phonetic alphabet of 47 characters. The older system, however, is the most used. In writing and printing in the Chinese and Japanese, the characters follow one another in vertical columns, beginning at the right of the page.

Of the Agglutinate languages there are the Turanian, the African, and the languages of the North American Indians. Agglutinate languages are so called because the union of several words in one compound word is a prominent characteristic. The Turanian is the most important division. The name Turanian is derived from Turan, a name given by the Persians to the country lying to the north of their own country which they called Iran, the two words being the opposites of each other.

It comprises all the languages spoken in Asia, Europe and Oceanica, with the exception of the Chinese and its allied languages, and the Aryan and Semitic languages, the two latter belonging to the inflectional division. The Turanian languages are again divided into the Northern, comprising the Tungusic, the Mongolic, the Turkic, the Finnic, and the Samoyedic; and the Southern, comprising

請
問
先
生
高
姓

FIG. 64.—CHINESE CHARACTERS.

the Tamulic or Dravidian, the Gangetic, the Taic and the Malaic.

The Tungusic is the lowest, and is spoken by the wandering tribes of Northwestern Asia. It is almost without grammatical forms. The Mongolic is that spoken by the people of Mongolia or the country north of China proper. It is higher in form than the Tungusic. Both are said to be improving. The Turkic is spoken by the Osmanlis, the ruling race of Turkey, and by the people of Turkestan and parts of Siberia. It is rich in grammatical forms. The Finnic is the language of the people of Finland. The Hungarian is a branch of it. Hungary possesses to-day a literature which, both in regard to its quantity and quality, will sustain a comparison with that of the most civilized among the western nations. The Samoyedic is the language of a people scattered over the northern part of Europe and Asia.

The Southern division consists of a number of dialects spoken by various peoples of India, Siam and Polynesia. A characteristic of the Turanian languages is that the root word is never obscured and when a modifying syllable is added it changes its vowel to harmonize with the root word.

The languages of Africa are exceedingly numerous and diverse. Some of them are allied to the Semitic of the Inflectional division and many of them have not yet been thoroughly studied. "The native languages of the New World are numbered by many hundreds, all differing totally in their vocabulary but still agreeing in the peculiar grammatical structure which has the name Incorporative. Their area is fast contracting, and they seem destined to disappear."

INFLECTED LANGUAGES.

The people speaking the Inflectional languages have been within the historic period the leaders of civilization,

and this order is classed as the highest or most perfect of the three great divisions of language. It is divided into two great families quite distinct in grammatical structure. They are the *Semitic, and the Aryan, or Indo-European.*

THE SEMITIC LANGUAGES.

The Semitic, or Shemitic, was so named because the people speaking these languages were thought to be descendants of Shem, the son of Noah. But the name is not well applied, since all the nations descended from Shem do not have languages akin to this family, and it includes many nations who were not descended from Shem. To this family belong the Ethiopic, the Hebrew, the Samaritan, the Phœnician, the Chaldaic and the Syriac, all of which are dead languages. The living languages of this family are the dialects of Arabia, of the Jews, and the New Syriac.

The Semitic languages are characterized mainly by their not using vowels except to modify or fix the meaning, the idea always being represented by consonants, by the root words generally having three letters, and their great number of prefixes and suffixes.

The Hebrew alphabet consists of twenty-two consonants ; the vowels are indicated by little marks above or below the letters. Some of the peculiarities of the grammar will appear in the following examples : *Gan*, garden, *haggan*, the garden ; *dod*, uncle, *dodah*, aunt ; *banim*, sons, *banoth*, daughters ; *lemosheh*, to Moses, *bemosheh*, in Moses, *kemosheh*, like Moses ; *shamor*, to guard, *eshmor*, I shall guard, *tishmor*, thou wilt guard, etc. In writing, the words follow one another from right to left.

The notion was for a long time entertained that the Hebrew was the original, and up to the building of the

tower of Babel, the only language of mankind. It is still believed by some. The Old Testament Scriptures were written in Hebrew and are the oldest writings in the Semitic family of languages.

The Hebrew language, though somewhat deficient in precision, is noted for its brevity, simplicity, variety of signification in its words, agreeableness of sound, and power of poetical expression.

The Arabic is a language exceedingly rich in words, 60,000 being the estimate. One word has often a great many meanings. It is said there are as many as a thousand different words for sword.

THE ARYAN TONGUES.

The Aryan, Indo-European, or as the Germans generally call it, the Indo-Germanic, is the highest family of languages. It includes the languages of all the most civilized nations of to-day as well as the languages of the ancient Greeks and Romans. The word Aryan is from the Sanskrit, and is thought to be from *ar*, to plow. Traces of it appear in *era*, the Greek word for earth, the word earth formerly meaning that which was *eared* or plowed. The word *ear* for plow was used in the old English as in the rendering of the xxx: 24, of Isaiah, "The oxen and the young asses *ear* the ground," and in Shakespeare we find the expression: "Let them go to *ear* the land." The word also appears in *Iran*, the native name for Persia, and some have thought in Ireland, the native name of which is *Erin*. "Aryan was the name given to the tillers of the soil and to householders, and the title by which the once famous Medes and Persians were proud to call themselves."

The Aryan family is divided into the following groups: The Indian, or Sanskrit; the Iranian, or Persian; the

Greek ; the Latin, or Italic ; the Celtic ; the Slavonic ; the Lithuanic ; the Teutonic, or Germanic. To the latter group belongs our own English. To show the close resemblance of these languages the following table has been arranged giving three common words as they appear in the respective languages named :

English	three	me	mother
Slavonic	tri	man	mater
Lithuanic	tri	manen	moter
Celtic	tri	me	mathair
Latin	tres	me	mater
Greek	treis	me	meter
Iranian	thri	me	matar
Sanskrit	tri	me	matar

Besides the resemblance in words themselves the grammatical structures of these languages have very many points of resemblance. This close resemblance in languages points to the fact of a common origin of the peoples using them. There must have been at one time in the distant past a race, or nation having a common language, but who by extension and separation became in the course of many generations greatly diversified as we find them to-day. The time when this unity existed can not be determined. It is variously estimated at from 3,000 to 10,000 years before Christ. In regard to the location of this ancient people, it is believed to have been somewhere in the highlands of Central Asia.

The Sanskrit is the oldest and most original of Aryan languages. Two thousand years ago it was the common language of a large class of the people of India, but since then it has been a dead language, that is, it has ceased to be spoken in its purity by the common people, but has been kept in use by an educated caste and by the labors of grammarians. The masses of India to-day speak

various dialects which have sprung from the Sanskrit, principal among which is the Hindustani. The latter is largely mixed with the Persian and Arabic.

The word Sanskrit (also written Sanscrit) means "the perfect language." A peculiarity of this language is its euphony, or agreeableness in sound. This is shown not only in its words but in the manner in which words harmonize with each other in a sentence. As above stated, it is the most original of the Aryan languages. This is shown by the fact that words in many of these languages may be traced back to Sanskrit roots. Another peculiarity of the language is its abundance of compounds, some of them exceedingly long and cumbersome. As an example, when one would speak in Sanskrit of "the river breezes made fragrant by maidens delighted with playing in the water," he would put it thus: "The water-play-delighted-maiden-bathing-fragrant-river-breezes."

The Sanskrit has an abundant literature, the most ancient writings being the *Vedas*, or sacred books. These works contain the religious and moral doctrines of the Brahmins, and will be further noticed under the head of "Religions of Man." The various dialects spoken by the Gypsies, those gregarious vagabonds who are found in almost all parts of the world, show evidence of having descended from the Sanskrit.

The Iranian, or Persian languages have several branches as follows: (1) The Zend, that in which the sacred books of the Persians are written. These books are called the Zend-Avesta. (2) The ancient Persian, remains of which are seen in certain cuneiform inscriptions in the ruins of Persepolis and in other Persian cities. (3) The Pehlevi, an ancient language of Persia, preserved in some religious works and in inscriptions. It is mixed to some degree with Semitic elements, and is not the same in all

the works. (4) The Pazend, another ancient language which succeeded the Pehlevi, and was in use until the development of the modern Persian. The latter is broken into numerous dialects, the purest said to be that spoken in Ispahan and vicinity. It is at present mixed with a large number of Arabic words, but is considered to be the most elegant language now spoken in Asia.

The Greek language is one of the most noted of the so called dead languages. There were five principal dialects, the old Ionic or Epic, the Æolic, the Doric, the new Ionic and the Attic. The latter was the dialect of the people of Athens, the ancient center of scholastic culture. Long before the Christian era, the Greek language was a highly cultured one and had an extensive literature. It was spoken in Greece proper and in various Grecian colonies along the Mediterranean and Black Seas. When Alexander the Great extended his conquests over a great part of the then known world; the Greek language was widely disseminated, but becoming mixed with other languages it became somewhat corrupted, and in time arose what was called the Hellenistic Greek. It was at this stage, soon after the time of Christ, and it was in this dialect the books of the New Testament were written.

After the Greek Revolution of 1821 an attempt was made to restore the ancient purity of the language, and to-day it is said one well versed in ancient or classic Greek will have little difficulty in understanding an Athenian newspaper. The people of Greece now speak various languages, the prevailing one, however, being the New Hellenic or modern Greek, which does not differ greatly from the ancient form. Volumes have been written upon the Greek language and literature, and the subject is taught to-day in all colleges and higher institutions of learning.

The Latin, of all the dead languages, concerns us more nearly than any other, for reasons to be given further on. This language was so called from the Latins, a people inhabiting Latium in Central Italy. It was in use in that country as early as a thousand years before Christ, and became the language of the Roman Empire, was spoken in all parts of Italy, and among the more educated in Gaul (ancient France), Germany, Spain, Portugal, and Britain, and Northern Africa ; in fact, wherever the conquering arms of the Roman people penetrated. There were two forms of it—one used by the polished classes, the other by the rustic people. The language reached its greatest perfection during the first century before Christ. Then flourished the great writers—Horace, Virgil, Cicero, and others. In the eighth century, A. D., it ceased to be a living language, breaking up into what are called the Romance languages, or the Italian, the Spanish, the Portuguese, the Provençal of Southern France, and the French. All of these languages contain a few words borrowed from the Teutonic. These words were introduced when the Western Roman Empire was conquered by the barbarians from the North.

The Latin contains a great many Greek words, which were introduced from time to time as a consequence of contact of the Romans with their neighbors, the cultured people of ancient Greece. Such words as theater, grammar, and tragedy came to us through the Latin from the Greek.

As to the origin of the Latin language, nothing definite is known. The Latins themselves had no traditions concerning it. From the fact that in structure it resembles the Greek more than any other language, it was once thought to be derived from the Greek. The early Greek and Roman writers speak of the Pelasgians as the com-

mon parents of both nations, but as to who the Pelasgians were, we are left in complete ignorance.

When the Latin ceased to be the language of the common people, after the eighth century, it continued to be the language of the courts of Europe for a long time; as well as the language in which all books were written; while scientific men of Europe spoke in French, German, and English, they wrote treatises on scientific subjects in Latin. To-day it continues to be the universal language of science throughout the world, so far as the naming of the species of plants and animals is concerned, and is to some extent the medium of communication between learned men of all nations. The Roman Catholic church continues still to use it as their official language. A knowledge of Latin is very useful as a part of a liberal education, since so much of our own English is derived from it.

The Italian language is noted for its softness, the sentences having a musical ring. Most of the words end in vowels, only five words in the whole language ending in consonants. A great many words end in "i." The letters k, w, x, and y are not used at all. The liquids l, m, n, and r are very frequently used. There seems to be a poverty of epithets and descriptive terms. There are a great many dialects of the Italian spoken in the different parts of Italy.

The French language uses the Roman or Latin letters the same as the English, with the exception of the w and k, which occur only in foreign words. The accent is not marked, the effect of which is to make the language somewhat monotonous. It is the most widely known of all languages among civilized people. Eminent German and English writers, as Humboldt, Leibnitz, Sir William Jones and Gibbon, have written their works in French.

It is spoken by about forty-five millions of people found in France, Belgium, Switzerland, Canada, French Guiana, and in many small areas throughout the world.

The Spanish language is spoken by the people of Spain, all of the republics of South America, most of the West Indies and Mexico, portions of Africa and the Philippine and Canary Isles. It is one of the most musical and beautiful of tongues. Through the medium of the Moors, it became mixed with the Arabic to some extent. Such words as alcohol, almanac, and algebra came to the English and other languages of Europe from the Arabic through the Spanish. It is spoken by about fifty-five millions of people.

The Portuguese language resembles the Spanish, but has more nasal sounds and less guttural, a lisping of the consonants, and a deepening of the vowels, rendering it softer and more fluent. It is called "the language of flowers" by the Spaniards, and by Francisco Dias, a modern Portuguese writer, "the eldest daughter of the Latin." In pronunciation it is between the Spanish and French. Like the Spanish, it has been much influenced by mixture with the Arabic. It is the language of Brazil.

The Provencal, another of the Romance languages, is spoken over a limited area, mostly the southern part of France. The language is noted in connection with the Troubadours, a school of poets who flourished about the twelfth century.

The Wallachian, spoken by the people of Roumania, now an independent State lying north of the Danube, has lately been classed with the Romance languages. It is allied to the Greek, Turkish, and Slavonic.

The Celtic (or Keltic) languages were spoken by a race of people called Celts, who, in prehistoric times, came from Asia into Europe. The word Celt means "an in-

habitant of the wood," and, according to the sounds of their alphabet, should be pronounced with the hard sound of c, or "kelt." They had no letter k in their alphabet, and the c always had the sound of k. According to our usage, however, the name when spelled with c is pronounced "selt."

The Celtic languages are divided into two well marked branches, (1) the northern, Erse or Gaelic, which includes the Irish, the Highland Scotch, and the Manx, or that spoken on the Isle of Man; and (2) the southern, Cymric, Briton or Cambric, which includes the Welsh, the Cornish, and the Armorican.

The Irish or Gaelic is still a living language, being used to a limited extent only in some parts of Ireland. It is taught in several of the principal colleges of Ireland. It has but 18 letters, j, k, q, v, w, x, y, and z being absent. The Highland Scotch, or as they call it, the Erse (pronounced Erish), is in reality the same language as the Irish, differing only in slight particulars. The language of the inhabitants of the Isle of Man differs from the other two, but in general structure is similar.

The Welsh is still used to a great extent in Wales, and in communities of Welsh settlers in the United States it is the prevailing language. Newspapers, periodicals, and books are printed in this language in the United States. In Welsh dd has the sound of th, and f the sound of v, while ff has the sound of f.

The Cornish was the language spoken by the people of Cornwall, England. It is now extinct. The Armorican is the language of the people of Bretagne or Brittany, a province of Northern France.

The Slavonic or Sclavonic, is another important group of the Aryan family of languages. The word is derived from Slave, the name of a people once inhabiting

the neighborhood of the Carpathian Mountains. This group is widely spread; the principal divisions which will be noticed here are the Russian, the Bulgarian, the Illyrian, the Polish, and the Bohemian. The earliest writing known in this group is a translation of the Bible, made in the ninth century, in the old Slavonic which was spoken by the Bulgarians of that time. The Russians still use church books written in the old Slavonic. The total number of people speaking Slavonic languages is estimated at 90,000,000.

The Russian language is the most widely diffused of the Slavonic group. It has 36 letters in its alphabet, and became a written language in the time of Peter the Great. It is descended from the old Slavonic, which, previous to this time, was the language of the church. As a consequence of the efforts of Peter to improve his countrymen, its vocabulary has been enlarged by the addition of many foreign words from the German, French, and Dutch. The number of words is very great; sometimes as many as 2,000 words are derived from a single root word. The manner of Russianizing foreign words may be seen in the following examples: Civilization, *tzivilizatzia*; poetry, *poezia*; department, *departament*. Many of the Russian names are very long, and contain a great many consonants, as our readers may have observed in reading of the Turko-Russian war.

The Bulgarian is the language of the people of Bulgaria, a large province south of the Danube, and tributary to Turkey.

The Servian or Illyrian is the language of the people of Servia, a now independent State lying west of Bulgaria. These tongues bear much resemblance to the Russian.

The Bohemian is the language of what was formerly

Bohemia, but now a part of Austro-Hungary. This language is harsh and strong, abounding in consonants, and is complicated in grammatical structure.

Poland was once a famous independent kingdom of Europe, but was stricken from the list of nations by the covetousness of neighboring powers, and her own internal dissensions. "In flexibility, richness, power, and harmony, the Polish is hardly excelled by any other language of Europe; its grammatical structure is fully developed and firmly established, and its orthography precise and perfect."

Lithuania, during the Middle Ages, was an independent State, later, a principality united to Poland, and, finally, became with Poland a part of Russia, except a small portion, which is now a part of Prussia. The language of the Lithuanians is related to the Sanskrit, and also to the Slavonic. It is sometimes classed together with the Lettish, a language spoken in parts of Prussia, and the old Prussian, with the Slavonic, and all called the Letto-Slavic language.

The German.—We now come to the last group of the Aryan family, and the one to which our own English belongs. The earliest monument of the *Teutonic* languages is a fragmentary translation of the Bible, made by Ulfilas, a bishop of the fourth century, into Gothic, the language used at that time by the Goths of the Lower Danube. The word Teutonic is from Teutones, the name of a tribe of ancient Germany. The Teutonic languages are divided as follows: (1) The *High German* in upper or Southern Germany. It is again divided into the Old High German, in use from the eighth to the eleventh centuries, the Middle High German, from the twelfth to the fifteenth centuries, and the New High German, which began with Luther's translation of the Bible, and has continued as the language of all German literature since.

(2) The *Low German* in Northern Germany and Holland. This is divided into (a) the *Friesic*, once spoken along the whole of the north coast of Germany, but now confined to a few localities; (b) the *Anglo-Saxon* or the *Saxon*, which was transplanted from Northeastern Germany to the island of Great Britain in the fifth and sixth centuries, and became the parent of the English; (c) the *Old Saxon*, spoken in the territory between the Rhine and the Elbe in Northern Germany, and which is regarded as the parent of the two following; (d) the *Dutch* or *Low Dutch*, the language of the people of Holland; and the *Low German* or *Plattdeutsch*, spoken by the lower classes in Northern Germany.

(3) The *Norse*, or Scandinavian, which includes the modern *Icelandic*, the *Swedish*, the *Danish*, and the *Norwegian*, which is but a dialect of the Danish. The Old Norse from which the modern Icelandic has descended with but little change, has preserved to us the religion and superstitions of the ancient Norsemen in the form of books of songs called Eddas and Sagas, most of which were composed in Iceland.

Of the Teutonic languages the *German* and the *English*, are the most important and widely diffused. The common origin of the two languages is seen in the close resemblance in many common words, as the following list will show :

ENGLISH.	GERMAN.	ENGLISH.	GERMAN.
winter	winter	sister	schwester
grass	gras	silver	silber
rose	rosa	gold	gold
summer	sommer	house	haus
garden	garten	man	mann
word	wort	cow	kuh
brown	braun	hand	hand
paper	papier	land	land

ENGLISH.	GERMAN.	ENGLISH	GERMAN.
finger	finger	foot	fuss
mother	mutter	light	licht
father	vater	to drink	trinken
ring	ring	to eat	essen
ball	ball	to have	haben
coal	kohle	to love	lieben
brother	bruder	to swim	schwimmen

This list might be greatly extended.

The Germans use the German letter in writing and print which differs very little from the old English letter. The English use the Latin or Roman letter, as do also the French, Italian, Spanish and many other languages of Europe.

The German language has an extensive literature, and it has much of the very highest type. The works of Goethe, Schiller, Lessing, Heine and of many others who might be mentioned, stand in the foremost rank among the world's great literary productions. The number of German writers of sufficient note to be mentioned in a thorough work on the literature of the country, is enormous. In one such work the names alone of writers occupy fifty-nine large, closely printed pages. The German writers have a tendency to be exhaustive, and their works are usually profuse. Goethe wrote more than fifty plays and it is said that the selected works of Sachs numbered 6,000. In 1876 there were published in Germany 12,516 different works.

The German language abounds in compound words made by simply combining common words. Some examples are given in a former part of this chapter. Expressions like the following are quite common: "Archimedes was sitting before his-in-the-sand-drawn figures." "A to-be-praised-action."

The following expression is a literal translation from a paragraph in a German newspaper: "The-him-for-two-hours-long-scolding-woman."

Another peculiarity is the use of separable verbs, or verbs which consist of a verb and a prefix, which may be used separately. When the prefix comes at the end of the sentence and the translation into English is made literally, we would have such sentences as the following: "The ball rolled the hill down." "The hunter rambled in the forest around." Much finer shades of thought may often be expressed by the German sentence than by the English.

The German is spoken by about seventy-five millions of people found in Germany, Austria, Hungary, Switzerland, Russia, North America, and scattered in various parts of the world.

The Anglo-Saxon from which our English is derived, was the language of part of the early inhabitants of Great Britain; as will be observed, the word Anglo-Saxon is a compound term. It is derived from the names of two nations of ancient Germany, the Angles and the Saxons. These people invaded the island of Britain, conquering and overspreading the country during the fifth and sixth centuries. Later, different detachments of invaders came over from Germany, and eight kingdoms were formed on the island, one of which was called East Anglia. These petty kingdoms were finally united into one called Anglia, or Angleland, whence the name England. The name Anglo-Saxon has come into use to designate the ancient language since the English of modern times is so different from that of the Saxon invaders. The people who inhabited Britain at the time of the Saxon invasion spoke a Celtic language. The contact of the Anglo-Saxon and the Celtic had little effect on the former, because the

aggressive Saxons drove the Celtic tribes continually before them, and established themselves as the ruling class.

A few words only have come to us from the Celtic. Among the number may be mentioned, *bard*, a poet, *druid*, the name applied to the priests of the Celtic religion; *crowd*, the name of an ancient instrument of music similar to a violin, and of more recent introduction; *brogue*, a coarse shoe, also meaning a dialect; *clan*, a tribe, or family; *shanty*, a small house; and *whisky*, a corruption of *usquebaugh*, "water of life."

In the seventh century Christianity was introduced among the Anglo-Saxons; as Latin was the official language of the church the introduction of a number of Latin and Latinized Greek words followed. Thus, beginning with the Greek *diaballein*, to slander, (literally "to throw through") we have *diabolos*, the slanderer, Latin, *diabolus*, Anglo-Saxon, *deofol*, English, *devil*. In like manner we may trace the word priest. The Greek *presbuteros* means older, from this comes the Latin *presbyter*, an elder, from which the Anglo-Saxon *preost* and the English *priest*. The words bishop, clerk, preacher, church, alms and several others may thus be traced back. The names of the months were also introduced from the Latin, but the names of the days of the week are from the Anglo-Saxon.

In the latter part of the eighth century the Danes invaded England, conquered the country, and for a time held the sway. The influence of the Norse or Scandinavian language, however, upon the Anglo-Saxon was not great. It appears that the Scandinavian invaders gave up their own tongue for the more cultivated speech of the people among whom they were thrown. Some of their own words were, however, added to the language they adopted. Traces of the Danish occupancy exist in

names of places, such as Ashby, Derby and Rugby, the Danish word "by" meaning a town or village.

At the same time the Danes were making their conquests in England, other Scandinavian adventurers were establishing themselves in that part of France opposite the island of Britain. These people were called Normans (North-men), and the country they conquered was called Normandy. Like the Danes in England, they dropped their own language and adopted the language of the natives of the country. This language was the French, a direct offspring of the Latin.

About the beginning of the eleventh century, England again changed rulers. These same Normans became their masters, and then began the infusion of the Norman-French into the Anglo-Saxon language. William, Duke of Normandy, laid claim to the English crown, and the battle of Hastings decided between him and Harold, the Saxon king. William the Conqueror, as he was called, reduced the people to a condition which might be called slavery. They were deprived of their lands and their property, and denied any of the offices of the State. Thus there were for a long time two distinct classes of people—the nobility, the army, the clergy, and the educated generally speaking the French, the common people retaining their Anglo-Saxon. But in time the two classes were united.

The English language was a final result of a kind of mixture of the Norman-French and original Anglo-Saxon. Says Dr. Hadley : " For five centuries after the Norman conquest, the language of England was in a constant and rapid process of change." The educated classes gradually took to using the language of the common people, but mingling it largely with words from the French.

A very large proportion of our words at present in use came from the Latin through the Norman-French ;

and the Norman conquest will always be regarded as marking an epoch in the history of the English language. Many words have come to us, also, directly from the Latin, and a large number from the Greek. The larger number of these words are the names of inventions, improvements, and discoveries in science, or terms made necessary by scientific discussion. As examples of such words, may be noted the various terms ending in "logy," as geology, physiology, and scores of others; names of inventions, as locomotive, telegraph, telephone, etc.; such words as electricity, atmosphere, pneumatic, and hundreds of medical terms, including the scientific names of diseases, as diphtheria, pneumonia, pleurisy, etc. Many of these words have passed into common use, and are part of the language of everyday life among all classes.

New terms are constantly being introduced into the language by the necessities of scientific research and progress in the arts of civilization. Political and social changes are also occasionally the cause of the introduction of new words. Words, in process of time, become obsolete, that is, they are no longer used, and are dropped from the language. Words also change their meaning in the course of time. Thus, in the time of Milton, the word *admire* meant "to wonder." The changes, then, which have been modifying our English language for the last three or four hundred years are still going on, though, perhaps, not so rapidly as in the centuries past.

A peculiarity of the English language is that it has in its descent from the Anglo-Saxon lost almost entirely its *inflection*, that is, the manner of indicating the different cases (or relations of words), and the differences of gender, number, and person, by different word endings. In this respect it differs from most of the languages of civilized nations.

According to Sharon Turner, the historian of the Anglo-Saxons, and Archbishop Trench, the English language is three-fifths of Saxon or Teutonic origin; but Max Mueller declares that the Norman elements are in the majority. He gives as his authority M. Thommond, who counted the words of Saxon origin, and found them to be only 13,230, as against 29,853 which were traceable to a Latin origin. Mueller, however, says that in grammatical structure the English language is decidedly Saxon.

The English language is spoken by about ninety millions of people, found in Great Britain, North America, West Indies, about the Cape of Good Hope, in Africa, Australia, New Zealand, and India.

Specimens of the Anglo-Saxon language and of the English at different periods are interesting, when compared with the English of the present day. The following lines are from an Anglo-Saxon poem, said to be one of the oldest in Europe. The poem is called "The Lay of Beowulf," and describes an expedition made by Beowulf to deliver a Danish king from a monster called "Grendel":

Tha com of more,
Under mist-hleodhun,
Grendel gongan;
Goddess yrre bar.

Then came from the moor,
Under mist hills,
Grendel to go;
God's ire he bare.

Here are a few lines from the "Song of Creation," a poem by Cædmon, an Anglo-Saxon poet, who died about 680 A. D.

Nu we sceolan herian
heofan-rices weard,
metodes mihte,
and his mod-ge-thone,
wera wuldor faeder!
swa he wundra ge-hwaes,
ece dryhten
vord onstealde.

Now must we glorify
the guardian of heaven's kingdom,
the maker's might,
and his mind's thought,
the work of the worshiped father,
when of his wonders each one,
the ever living lord
ordered the origin.

Chaucer may be called the father of English literature. He died in 1400. The following lines from his poems will not need translation, as, with the exception of the quaint spelling, it differs but little from modern English :

“ A good man was ther of religioun,
And was a poure Parsoun of a town;
But rich he was of holy thought and werk.
He was also a lerned man, a clerk
That Cristes gospel trewely wolde preche;
His parischens devoutly wolde he teche.
Benign he was and wonder diligent,
And in adversite full pacient.”

It is necessary, however, to have a glossary for the ordinary reader to understand him fully, as so many of the words are purely Saxon and no longer in use.

In 1526 William Tyndale published a translation of the New Testament. A quotation from this work will give an idea of the appearance of the English at that date : “ When Jesus was come downe from the mountayne, moche people followed him. And lo, there came a lepre, and worsheped him sayinge, Master, if thou wylt, thou canst make me clene.”

IDIOMS.

Every language has its peculiar forms of expression and certain combinations of words acquire by usage a fixed and definite meaning which is often entirely different from that indicated by the grammatical structure. These modes of speech are called idioms, or idiomatical expressions. The following table of English phrases with their corresponding ones translated literally from the German, will illustrate this peculiarity :

ENGLISH.

GERMAN.

I am sorry.	It does me sorrow.
I am right.	I have right.
I am hungry.	I have hunger.
What is the matter with you?	What fails to you.
I have cut my finger.	I have myself in the finger cut.
I have broken my leg.	I have for me the leg broken.

The language used in salutations among different peoples illustrates these peculiarities of expression, as the following will show :

English—How do you do? or How are you? German—How do you find yourself? or How goes it? French—How do you carry yourself? Dutch—How do you fare? Swedish—How can you? Russian—How do you live on? Egyptian—How goes the perspiration? Chinese—Is your stomach in good order? Polish—Art thou gay?

VALUE OF ETYMOLOGY.

While at first thought it may not appear so, yet the study of the origin and history of words is a very interesting and profitable one. Emerson once spoke of language as "fossil poetry"—Archbishop Trench, in commenting upon this, says: "He evidently means that just as in some fossil, curious and beautiful shapes of vegetable or animal life, the graceful fern, the finely vertebrated lizard, such as now, it may be, have been extinct for thousands of years, are permanently bound up with the stone, and rescued from that perishing which would otherwise have been theirs—so in words are beautiful thoughts and images, the imagination and the feeling of past ages, of men long since in their graves, of men whose very names have perished there, which would so easily have perished too, preserved and made safe forever."

Thus we have preserved in words the imaginations

and beautiful thoughts of men, historical information, scientific facts and moral truths as perfectly as the delicate wings and legs of the insect are preserved in the fossil gum known as amber. As illustrative of this I give a few random examples taken mainly from Trench, on the study of words :

We have preserved in the word *sierras* the imagination of the man who first applied this name to the mountain ranges of Spain. Seen at a distance the mountain ridge appears as a gigantic saw, the individual peaks forming the teeth. The word *sierras* means "*saws*." A little history is connected with the name also, since it appears in our American geography and we readily see how the conquering and invading power of Spain, once one of the greatest nations of Europe, brought it here.

The word sincere means literally "without wax," and was applied originally to pure honey. It was a beautiful thought of the man who first applied it in the sense we use it now, pure, truthful, unfeigned, unmixed with bad, or wrong motives or thoughts.

Did it ever occur to the reader that the word frank, meaning "free, open, generous," and the names France and French all came from the same root? The *Franks* were a powerful association of German tribes who called themselves "the Franks," or "the free," and at the time of the downfall of the Roman Empire obtained possession of Gaul and gave it their own name, the country of the Franks, or France. The French people to-day are characterized by this freedom of manners and impulsive disposition. The standard coin of France is the franc and when we speak of the "elective franchise" we mean the freedom of expressing our desires by a vote. The word slave, however, has a history of an opposite character, coming from Slav or Sclov, meaning "free," this being

the name of a once powerful tribe of Europe, whose descendants became slaves of the Germans.

We do not see the real force and significance of many words until we learn their origin. Take for example the word tribulation. It is from the Latin word *tribulum* which means a "threshing-sledge." Can you not, reader, at once see more force in the word? Again, the word desultory, which we define as rambling or passing from one thing to another without orderly connection, is from *desultor*, a leaper, and was used as the name of a circus performer who, riding several horses at once, leaps from one to another. The word capricious is also a good example. It is from *capra*, a goat, and any one who will watch the actions of a goat, will observe how sudden and unexpected are many of its movements.

Our word squirrel can be traced back through the Norman French and Latin to the Greek and will be found there made up of two words, one of which means "shade" the other "tail," alluding, no doubt, to the habit this animal has of shading his head and body with his tail.

Pages might thus be filled with the history of words. It will prove an interesting pastime for any one to take a copy of any large dictionary and look up the derivations of common words as they may occur to the mind. Much valuable knowledge will at the same time be almost unconsciously stored away for future use.

In concluding this chapter a good word for our own English tongue will not be out of place. Says Prof. A. H. Sayce of Oxford, England: "English may be heard all over the world from the lips of a larger number of persons than any other form of speech; it is rapidly becoming the language of trade and commerce, the unifying elements of modern life. Science, too, is beginning to claim it for her own, and it is not long ago that a Swedish

and Danish writer on scientific subjects each chose to speak in English rather than in their own idioms, for the sake of gaining a wider audience. Little by little the old dialects and languages of the earth are disappearing with increased means of communication, the growth of missionary efforts, and let us add, also, the spread of the English race, and that language has most chance of superseding them which, like our own, has discarded the cumbrous machinery of inflectional grammar."

Whether any one language will ever become universal is very doubtful. At one time the Latin was the ruling language of the civilized world, and was constantly spread by the whole influence of the Roman Empire. To-day it is a dead language. The influence of race, religion, and diverse interests, with the separation of mankind by wide oceans, would seem insuperable obstacles to a universal language, for these very causes operate to disintegrate an established language.



COIN OF CYZICUS.

CHAPTER IV.

CUSTOMS AND NATIONAL TRAITS.

This is eminently a world of variety. The actions of man are as various as his physical features and surroundings. We call that queer or odd which is unlike that to which we have been accustomed. The individuals of other races and the customs of other countries are queer to us because the people are different from us, and their customs from our customs. Our ways are as queer to them as theirs are to us, and a white man would be as much of a curiosity to an African negro who never had seen one, as the natives of Africa when seen for the first time would be to us.

Some writer speaks of an Indian chief who, when he saw a black negro for the first time, thought the man was painted, and passed his hand over his face to see if the black color would rub off. The natives first seen by the Spaniards in America were astonished to see the latter dismount from their horses, for they thought the man and the horse to be all one creature.

CUSTOMS CONCERNING THE TREATMENT OF CHILDREN.

When a child is born in this country it is common for the mother to be carefully nursed for some days, but what is as true as it is strange, is the fact, that, among some races the husband on such occasion is put to bed and carefully nursed, while the woman goes about the household duties.

This custom is, indeed, widely distributed. It is common in South Africa, in Brazil, in Guiana, in Greenland and Kamtschatka. Max Mueller suggests the following explanation for these singular customs; "It is clear that the poor husband was at first tyrannized over by his female relations and afterward frightened by superstition. He then began to make a martyr of himself till he made himself really ill, or took to bed in self-defense." It may be remarked in this connection that there is a popular notion among the common people in this country that when a woman has the morning sickness incident to pregnancy the husband is apt to be afflicted in a like manner.

In some countries the husband refrains from eating certain kinds of meat before the expected birth of a child, lest it in some way injure the infant. They think that the child will partake of the nature of the animal which is eaten by the husband.

Many savage tribes have a great aversion to twins. They think it a disgrace when twins are born in a family, because it makes them resemble the lower animals, or regard it as an evidence of infidelity on the part of the wife. Frequently one of the twins is killed, and in Guinea, according to Smith and Bosman, both the twins and the mother are put to death.

In Norway and Sweden the surname or family name of the child is formed by adding the termination *son* to the first name of the father. Thus John Anderson's children would have the general name Johnson and if one of them was named Thomas Johnson *his* children would have the name Thomasson, or Thompson, and so on. In Australia the case is quite different; when the first child is born the father takes the name of the child. Thus if the child were named Kadli, the father would be called Kadlitpinna, that is, father of Kadli. This custom prevailed also among

American tribes. In Sumatra the father takes the name of his first child and drops his own name.

Herodotus wrote: "The Lycians have one custom peculiar to themselves, in which they differ from all other nations, for they take their name from their mothers, and not from their fathers, so that if any one asks another who he is, he will describe himself by his mother's side and reckon up his maternal ancestry in the female line." This was recorded by the "Father of History," about 400 years before Christ. But the same custom prevails among many nations to-day. Among the Limboos of India the father buys the boys of the mother with a small sum of money and they are henceforth members of his tribe. The girls stay with their mother and belong to her tribe.

The New Zealanders make their infants swallow small stones so that their hearts may be incapable of pity.

In Siam the first, third and fifth child, or all those representing odd numbers are considered as belonging to the mother, while the second, fourth and so

on, all that represent even numbers, belong to the father.

The Siamese have very peculiar customs connected with the event of the birth of a child. The mother is placed before a large fire which is so near that she is almost roasted with the intense heat and she is kept in this position for a period varying from eleven to thirty days. Death is often the result of this cruel custom, but so deeply rooted has it become that no amount of argument, or persuasion from foreigners will avail to induce them to pursue a different plan. They say they never knew any other kind of treatment, and are afraid to try rash experiments.

Among the Calmucks, as soon as a child is born it is taken out of the tent, and the first animal or object which



FIG. 66.—ANCIENT GREEK CRADLE.

may present itself to its eyes furnishes a name for the infant. The age of a man is not reckoned from the day of his birth, but from the general birthday, which is the first day of the year; and if a child is born a few days before this day, it is reckoned to be two years old.

Infanticide, as regards female children, is very common among savages, and is even practiced to some extent among the Chinese, whom we regard as in a degree civilized. The reasons for destroying female children are obvious. Scarcity of food, and the fact that females did not hunt nor

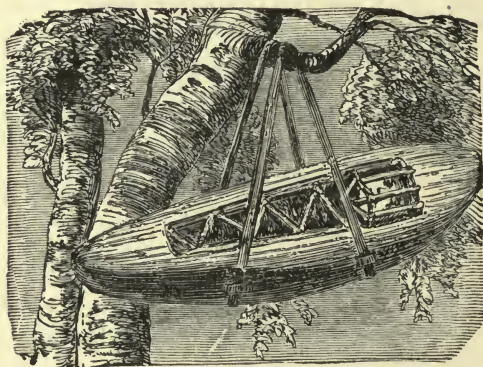


FIG. 67.—LAPP CRADLE.

fight, and were a temptation to surrounding tribes, were sufficient motives to the minds of savage men to lead them to lessen the number of females by putting to death a part of them as soon as born. In China it is practiced mostly by the poorer classes, who are not able to support so many children. Sometimes they are allowed to grow for a few years, and then sold to the rich classes as servants; but usually the argument is, that it is better to kill them than to sell them as slaves. The Australians destroy all children who have any bodily deformity.

The Laplander's wife places her child, as soon as born,

into a piece of hollow wood, with the opening protected by wires. This she carries on her back when on a march, and when at rest she hangs it to the limb of a tree, the child being protected by this arrangement from the attacks of wild beasts.

In Abyssinia, as soon as a child is born, a warrior thrusts a lance through the window and into the child's mouth, to make it courageous. Then a fowl is brought in, and its throat is cut in front of the child and the women shout twelve times for a boy, and three times for a girl. They then run out and try to catch the men, and force them to make them a present.

MARRIAGE CUSTOMS.

Says Sir John Lubbock: "Marriage, and the relationship of a child to its father and mother, seem to us so natural and obvious, we are apt to look on them as aboriginal and general to the human race. This, however, is very far from being the case. The lowest races have no institutions of marriage, and true love is almost unknown to them; and marriage, in its lowest phases, is by no means a matter of affection and companionship."

The Algonquins of North America have no word in their language which means to love, and when the Bible was translated into their language, a word had to be invented. Among many nations, marriage is only a kind of slavery, and among others a mere animal pairing or mating. A traveler once asked a savage why he did not make merry with his wives. He replied if he did that he could not manage them, as they would laugh when he commanded them to do anything.

True love and the conjugal state seem to belong exclusively to a civilized condition of man. Kisses and caresses are essentially incident to civilization. Many savage tribes are entirely ignorant of the art of kissing, and what we term courtship is unknown. Taking a wife is with them like buying a horse, or catching a wild animal.

In Sumatra there are three kinds of marriage: First, in which the man purchases the woman; second, in which the woman purchases the man; and third, in which they join on a footing of equality.

Among the Hassaniyeh Arabs the woman is legally married for three days out of every four, and on each fourth day she is free. Among the Reddies of Southern India, a woman of sixteen or twenty may marry a boy of five or six, but until he grows up she may live with some adult, and if they have children they are considered as belonging to the boy-husband. The latter, in turn may, when he grows up, live with some other woman who has a boy for a husband.

Polygamy, or the possession of more than one wife at a time, is almost universal among the lower races. Sometimes the number of wives is very great. The king of Ashantee always keeps 333 wives. *Polyandry*, or the marriage of one woman to several men at one time, is not very common, but is practiced among some tribes.

Among many tribes of savages there is nothing like a marriage ceremony, the parties merely assuming the condition of a marriage state. Among the Bedouin Arabs, when a girl is married, they have a ceremony; but when a widow is married, they consider a ceremony unnecessary.

Among the Canadian Indians the bridegroom, as soon as the chief pronounces the pair man and wife, takes his bride on his back and carries her to his tent.

The ancient Greeks and Romans had a custom of pretending to carry away the bride by force; and in some parts of France, as late as the seventeenth century, it was common for the bride to pretend reluctance to enter the house of the bridegroom.

The natives about Sidney, Australia, have a very barbarous way of procuring wives. The girl is stolen upon,

knocked down with a club, and dragged away through the woods by one arm. The protectors of the girl do not resent this outrage, but retaliate by a similar act upon the females of the opposite party.

The practice of taking wives by force is a common one, but frequently the violence is only pretended, as in some of the following instances. As wives were nothing more than slaves, it is probable that the most primitive mode of procuring wives was by force from a neighboring tribe, and the mock violence used as a ceremony may be only a way of commemorating an ancient custom of the tribe.



FIG. 68.—NEW ZEALAND WOMAN.

The New Zealand women are very strong and robust, and when a man wishes a wife, he must gain her by superior muscular strength. If he succeed in carrying her off by force to his own house, she is his ; but if she gets away from him, and gains her father's house, he loses all chance of obtaining her. Another practice among these people is more

romantic. The girl is allowed to select the swiftest horse, and ride off at full speed. The lover, having given her a sufficient start, pursues, and if he succeeds in catching her, he can claim her as wife, if not, the match is broken. When this arrangement exists, the girl is never married against her will.

Among New Zealanders it sometimes happens that two young men want the same girl. In this case, the father of the girl tells them they can settle the matter by a pulling match, and this consists in each lover taking one

of the girl's arms, and trying to drag her to his own house. The one who succeeds marries the girl. Sometimes the struggle is so great that the woman's arms are dislocated.

In Circassia, the bridegroom rushes in amidst the parties at the wedding-feast, and, with the help of a few young men, seizes the bride and carries her away by force.

Among the Chittagongs of India, the marriage ceremony consists in the bride taking her seat on her lover's knee, with a cup of wine, drinking half, and her lover the other half, and then hooking their little fingers together.

A ceremony, well known in the East, is that the couple eat out of the same dish, as a sign of union ; and another, where the garments of the bride and groom are tied together.

The Dyaks, of Borneo, have a very curious marriage ceremony. The couple are required to seat themselves upon bars of iron, as a token that the blessings of married life are to be as strong as iron. The priest then gives the man a cigar, a betel-nut, and some sirah leaves. He then takes two fowls, waves them over their heads, and invokes a blessing upon them. Then he knocks their heads together three times, after which the man places the betel-nut in the woman's mouth and the cigar between her lips. Then she does the same to him, and they are considered man and wife.

In China the groom stands on a high stool, and the bride prostrates herself at the foot of the stool. This is to show the great superiority of the husband over the wife. In some cases the bride is lifted over a pan of charcoal at the door of the bridegroom's house.

In China, if a grown up son or daughter die unmarried, it is regarded by the parents as a deplorable fact. If

they think death approaching, immediate arrangements are made for marriage. There is a certain class of people, who are called go-betweens or match-makers, whose business it is to select wives for men. These persons are consulted by the parents, and in some parts of the country the parties are affianced in infancy.

Chinese ladies ordinarily use large quantities of cosmetics, but on the day of their marriage they do not, in order that the groom may see what they really look like. Sometimes the bride is kept up the greater part of the night, by the friends of the groom, asking her riddles. If she can not answer, she must pay a forfeit of cakes.



FIG. 67.—CHINESE BEAUTY.

The Niam-niams, of Africa, are proud of large families, and punish adultery with death. The men, contrary to the usual rule among barbarous people, seem to have great affection for their wives. This seems strange, when we are told that these

people often eat their own relatives.

Among the natives of Yunnan, in Asia, there exists the following peculiar mode of courtship: The men and women arrange themselves on opposite sides of a gulley, The women throw balls to the men, and whoever catches a ball, gets the thrower for his wife. It may be well to say that the women generally manage to throw the balls so that the right men will catch them.

In the time of Homer, it was the custom of the bridegroom to bestow rich gifts upon the bride. Iphidamus, it was said, gave a hundred heifers and a thousand goats as a nuptial present. The bestowal of gifts, both by the

bridegroom, and parents, and friends of the parties, has been and is to-day a very common custom all over the world. Wedding processions, feasts, games, and sports are also common adjuncts of marriage ceremonies everywhere, and to describe in detail the varieties of marriage customs in existence would require a volume.

It is the custom of the Garos of India, for all proposals of marriage to come from the female side. Their marriage ceremony is also a reversal of the ordinary rule. The wedding party, after bathing the bride in the nearest stream, proceeds to the house of the bridegroom, who pretends to be very unwilling, and runs away. They pursue and catch him, take him to a stream, give him a similar ducking, and then, amidst the feigned grief of his parents, he is taken to the home of his bride.

Among the natives of the Philippine Islands when a man wishes to marry, the parents of the girl he has selected, send her before sunrise into the woods. After the lapse of an hour, her lover is allowed to start in pursuit. If he succeeds in finding her before sunset she becomes his wife, if not, he must abandon his claim.

Among the Apingoes of Africa if a man falls in love with the wife of another and she reciprocates the affection he may purchase her of her husband, who is compelled to sell her for the same price he paid for her.

After a Kaffir is married he must not speak familiarly



FIG 70.—BELLE OF ANCIENT GREECE.

to his mother-in-law, nor ever look her in the face. If he wishes to communicate with her he retires to a little distance and shouts to her. If the two happen to meet in a path the mother-in-law hides behind a bush and the man holds his shield before his face until he gets past the place.

DECORATION AND DRESS.

Savages place decoration superior to dress. An Indian will paint his body with bright colors and stick gay feathers into his hair while he shivers with the cold. Travelers and traders find that barbarous people will prize beads and toys more highly than flannels or calico. It is a sad comment upon our civilization to say in this connection that many people of our own country think more of having their clothes cut in a certain style than of having them convenient; and choose fineness of material in preference to warmth and comfort. The lady will submit to the uncomfortable pressure of a tightly laced corset and the gentleman to the inconvenience of a tight-fitting boot rather than to be out of the fashion, and be comfortably dressed.

The custom of tattooing, or marking the skin with indelible lines is very common among many tribes of uncivilized races. Indeed, it is not altogether absent among members of our own race. Who has not seen men with their names or certain devices pricked into their arms or hands with India ink? This is no doubt a relic of barbarism. Tattooing seems to have been at different times practiced in all parts of the world. It must have been practiced by the surrounding nations in the time of Moses, since he gives a law prohibiting it to the Hebrews: "Ye shall not make any cuttings in your flesh for the dead, nor print any marks upon you."—Lev. xix: 28. The ancient Britons practiced it and it was even known after the Norman conquest.



SIoux CHIEF.



FIG. 72.—SOUTH SEA ISLANDER.

The markings are made by scratching or pricking with some sharp instrument dipped in a mixture of charcoal and water. Sometimes the skin is raised in welts, or ridges, by cutting it, taking out a strip of flesh, and rubbing in the wound palm oil and ashes. The process is extremely painful, but it is considered a mark of unmanliness to show any signs of suffering under the operation.

The natives of New Zealand excel all others, perhaps, in the art of skin ornamentation. Their patterns consist usually of curved and spiral lines. Some tribes ornament the face only, others the entire body, and one traveler says, that this "in the absence of clothing gives a finish to the skin."

The Chinese custom of deforming the feet by bandaging them during infancy is another example of the attempt to improve upon nature. It is said that some of the Chinese ladies have feet so small that they can not walk at all, and when a house takes fire they frequently perish in the flames because they are unable to get out. The nearest approach to this barbarous custom is the modern Parisian shoe for ladies.

A tribe of North American Indians, known as the Flat Heads,



FIG. 73.—CHINESE SMALL FOOT.

practice what they consider an improvement upon the shape of the head. The mode of procuring this result is shown in Fig. 74. The compression does not seem to affect in any way the intellectual power of the person operated upon.

Ladies of the present day who would like a new style of arranging their hair should study the Fijian customs as shown in Fig. 75. Many of the Fiji chiefs keep a



FIG. 74.—FLAT HEAD INDIAN AND CHILD.

special hair dresser to whom they give several hours of their time each day. In some cases the hair is made to stand out from the head until the whole mass measures nearly five feet in circumference.

That they may not disturb this arrangement when sleeping, they lie with their necks across wooden racks, or pillows made for the purpose. They also dye their hair, sometimes having several colors in the same head. What is singular, the custom of dressing the hair in this manner,

is confined to the male sex, while the women cut their hair off close to the head.



FIG. 75.—FIJI MODES OF DRESSING THE HAIR.

Some of the chiefs among the natives of the Marquesas Islands shave off all the hair of their heads and

wear an ornament consisting of a large roll of hair taken from the heads of their wives.

It is the custom among many savages to pull out every hair which makes its appearance on the face. This is done by many of the North American Indians. The custom of shaving all or part of the head is also quite common.

The Botocudos of Brazil wear necklaces of human teeth and ornament their lips and ears by attaching large pieces of wood. They sometimes utilize these lip-ornaments by cutting up their food upon them as upon a table.

Among the nations of the Andaman Islands, a common ornament is a necklace made of the finger bones of deceased relatives, and among the Polynesians a widow often wears the skull of her deceased husband round her neck as an ornament.

The natives of the east coast of Australia wear for ornament a piece of bone five or six inches in length thrust through the cartilage of the nose. Among the Bongoes of Africa the men pierce the skin over the stomach and insert pieces of wood by way of ornament. Some of the New Zealanders when first visited by Europeans had large holes made in their ears in which they were in the habit of thrusting bones, feathers, teeth of dogs, nails and teeth of deceased relatives; in fact, anything they considered valuable or curious, and when the sailors gave them iron nails they immediately placed them in their ears. The Zulus of Africa, some of whom were brought to London lately, carried their cigars in the holes made in their ears.



FIG. 76.—BOTOCUDO WOMAN (BRAZIL).

Various tribes in Africa file their teeth in a diversity of ways for the sake of ornament. The practice of staining the teeth is also common among many savages. Staining the eyelashes and lips is also very fashionable in many places.

The habit of wearing ear-rings and other jewelry, among civilized people to-day is only another example of the survival of savage and ancient customs. Deforming the human body for ornament has almost disappeared among civilized people, but not so with the deforming of domestic animals, as for instance the habit still in vogue to some extent of docking and nicking horses' tails, cutting off the ears and tails of dogs, etc.

DRESS OF VARIOUS AGES.

Full and accurate delineations of the costumes of the ancient Egyptians, Chaldeans, Assyrians, Greeks and Romans have been left us in statuary, wall paintings, etc. For delineations of Egyptian and Assyrian costumes see figs. 30, 31, 32, 33, 45, 122, 159, 165. The accompanying illustrations, pages 212, 213, fully delineate the ancient Greek and Roman dress. Also see figs. 47, 118, and 70. From the latter it will be seen that the lady of ancient times loved fine clothes and striking effects in color and ornament fully as much as her fair descendant now-a-days. In ancient times and until lately, the difference in style of dress between the ruling classes and the poor was very great. Egyptian slaves were and are to-day practically naked.

This is strikingly illustrated by comparing fig. 81, the Anglo-Saxon middle class with their Norman conqueror fig. 82, and William the Conqueror, fig. 194, also by comparing the middle class, fourteenth century, fig. 88, with a fashionable pair of the same time, fig. 83.



FIG. 77.—GREEK HEAD DRESS.



FIG. 78.—GREEK FOOT DRESS.



Half Open Doric Dress.



Open Doric Dress.



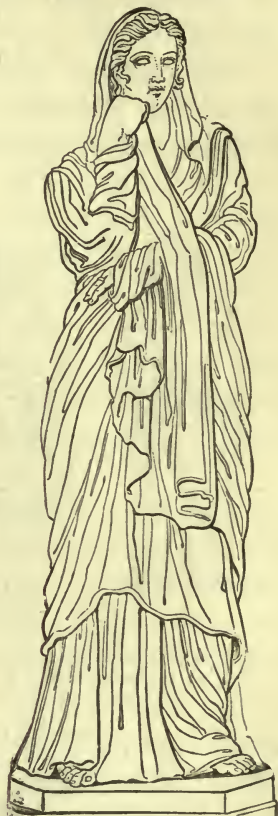
Chlamys (Cloak).
Statue of Phocion.

FIG. 79.—GREEK DRESS.

In regard to strange customs in dress little need be said, although a volume might be written describing costumes of different ages and various nations. The engravings in this connection throughout this volume will



The Emperor Lucius Severus.



Younger Agrippina.

FIG. 50.—ROMAN DRESS.

tell their own story. It may be said, however, that much as we may wonder at the peculiarities of fashion in our days, the styles of these are very plain and simple compared with those which held sway one or two centuries ago. We are all made more or less familiar with the

costumes of the last century and the previous, by the engravings in historical and other works. We ought to congratulate ourselves that our customs regarding dress and ornament are much farther removed from the fashions of the savages than they were in the days of our forefathers.

Our modern costumes seem to be modifications of the ancient Roman dress combined with styles of the Teutons and Anglo-Saxons. The Romans wore a loose



FIG. 81.—ANGLO-SAXON COSTUMES TIME OF CONQUEST 11TH CENTURY.



FIG. 82.—NORMAN GENTLEMAN 800 YEARS AGO.

upper garment called a tunic, and a dress for the lower limbs called braccæ, from which is derived our word breeches. The Britons called the tunic a *gwn*, from whence our word gown. This is the origin of our word coat. Breeches reached only to the knee, but when trousers, which reached to the ankle, were introduced, breeches were generally called knee-breeches. Trousers, or pantaloons (so called in England, and pants in the U. S.) were first worn by boys, then adopted by the army, from whence they gradually came into common use. In

England even at the present day an occasional old gentleman may be seen wearing knee-breeches.

In all countries and in all times man has been prone to extravagance in dress and ornament. Among the ancient Jews, the most moral people of their age, the prophets found it necessary to denounce the pride which finds a gratification in fine clothes. The Greeks were a more sensible people perhaps in respect to food and clothing than any other nation, ancient or modern. The

Romans had a public officer called *censor*, whose business it was to look after the morals of the people and check extravagance in domestic life. His services availed little, for the accounts of Roman extravagance read like fairy tales.

Sumptuary laws, that is, laws intended to regulate the expenditures of the private citizen, have been known in nearly all ages except our own, but have usually failed in their object. Our own



FIG 83.—UPPER CLASS, 15TH CENTURY.

sturdy Anglo-Saxon race has been no exception to this rule, as a study of the accompanying illustrations will show, most of which, with the exception of the Greek and Roman, represent English life.

In the time of Edward II. of England (1307-1327) and of Edward III., the upper classes wore shoes with extravagantly long pointed toes. Some of these shoes were two feet in length and turned up at the toes, which were attached with gold chains to the knees. Laws forbidding

them proved ineffectual. Gentlemen even wore bright colored hose with different colors on each foot.

In the time of Queen Elizabeth, (1558-1603), the grow-



FIG. 84.—SHOES IN TIME OF EDWARD II.

ing wealth of England caused extravagance in dress on the part of the wealthy. The courtier of the time, fig. 87, is laced, ruffled and bespangled to the extreme of absurdity.



FIG. 85.—QUEEN ANNE SWELL.



FIG. 86.—LADY, QUEEN ELIZABETH'S TIME.

In the eighteenth century fashions in dress reached the highest pitch of absurdity. The men wore wigs, broad brimmed hats turned up at the sides, and ornamented with

feathers, coats and waistcoats of velvet, silk and satin, of green, blue, crimson, scarlet or other rich color, silk stockings drawn over the knees, immense shoe buckles, etc. Women wore hoops of monstrous size and headdresses and collars indescribable in words. Hoops five or six feet in diameter were worn so that one woman occupied the space of six men. It was facetiously proposed to



FIG. 87.—COURTIER OF QUEEN ELIZABETH'S TIME.



FIG. 88.—COSTUME OF MIDDLE CLASS, 15TH CENTURY.

make carriages with movable tops and let the ladies in by means of ropes and pulleys. In 1856 there was a revival of large hoops and the extremes in this regard were almost as great as in the eighteenth century.

These illustrations of ancient and middle age costumes have been obtained from paintings and sculptures on tombs, monuments, etc.; from statuary, from coins and engraved gems, vases, etc.; also from ancient carvings,

MSS., prints and tapestry. The *Bayeux tapestry* worked by ladies of the Norman court, is a very fruitful source of such illustrations of the time of the conquest.

ORIGIN OF SOME COMMON CUSTOMS.

Did it ever occur to the reader to question the origin of certain peculiarities of our modern customs? For example, why are buttons sewed upon the back and sleeves of coats, and why is there a notch in the collar of a coat? There was a time when coats were furnished with a sur-circle fastened behind by buttons; sleeves were made long to be turned down over the hands in place of mittens, or gloves, and when not so used were turned up and held by buttons. Coat collars were made at first to turn up around the neck, hence the notch. Hat bands are survivals of draw-strings used in the ancient caps. Plumes and cockades are always worn upon the left side, because in the time of Charles II. they were so large as to impede the use of the sword if worn on the right side.



FIG. 89.—HEAD DRESS
15TH CENTURY.

In this connection it may be mentioned that until recently in England it was common for physicians to carry round-headed canes. It is a survival of the custom physicians once had of carrying some aromatic substance in the head of their canes which they held to their noses when they examined a patient, under the belief that it would keep off contagious diseases. Persons to-day wear asafoetida suspended from their necks for the same purpose. It is thought by some that a physician's cane was a relic of the magician's wand, by others that it was once used to beat sick persons, since there was a time when beating was considered a remedy for certain diseases. Galen



ALASKANS.

recommended beating as a means of fattening people. In some places mothers beat their children's feet as a cure for chilblains.

The barber's pole is another curiosity. It is explained by the fact that barbers were once also surgeons. The red on their signs represented blood, and the white the bandage used. Physicians formerly carried muffs of large size to keep their hands in delicate condition.

Among the Dinkas of Africa the women wear clothing, but the men do not. They contemptuously call a clothed man a woman, and consider it very improper for men to wear clothes. Among the Bongoes, a tribe living in an adjoining district, the men wear clothes and the women go naked. The natives of the Andaman Islands wear no clothes, but plaster their bodies frequently with mud to prevent the bites of insects.

MODES OF PUNISHMENT.

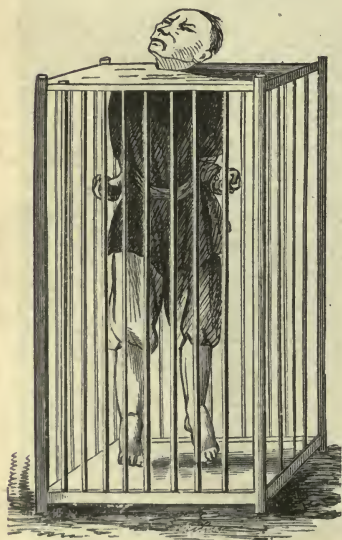


FIG 91.—CHINESE PUNISHMENT.

China has many strange customs, but in the matter of punishing crime, the Chinese are particularly noted for their cruelty. The heads of those who have committed capital offences are cut off and exposed to the public view, often in the immediate neighborhood of the scene of their crime, as a warning to others. Sometimes the criminal is tied to a cross by cords around the waist and arms, and then strangled by putting a rope around his neck and drawing tightly against the up-

right piece. For minor offences the name of the crime is sometimes tattooed upon the face of the criminal. If a man steals a small article it is hung around his neck, while his hands, being bound, he is whipped through the streets. Two other methods of punishment are represented in the accompanying engravings.

Our Puritan fathers punished dueling by tying the



FIG. 92 - CHINESE PUNISHMENT.

offenders together by their necks and heels, and keeping them in that position for a certain time. The accompanying cut illustrates a method of punishing drunkards in England in the seventeenth century.

It was a common practice in England from the fifteenth to the eighteenth century to punish scolding wives by means of the *ducking stool*. This consisted of a chair fastened to one end of a long beam, which was supported

at the middle point upon a pivot in a post set at the edge of a pond. The offender was tied fast in the chair and by working the beam in the manner of a see-saw she was immersed in the water. The *cucking* stool was another contrivance used for men as well as women. It consisted in a chair in which the offender was tied before his or her own door to be pelted or insulted by the mob. The following is an extract from the laws of Virginia, enacted 1662: "Whereas, many babbling women slander and scandalize their neighbors for which their poor husbands are often involved in chargeable and vexatious suits, and



FIG. 93.—DRUNKARD'S CLOAK.

costs of great damages,—Be it therefore enacted by the authority aforesaid that in action of slander, occasioned by the wife, after judgment passed for damages, the woman shall be punished by ducking; and if the slander be so enormous as to be judged at greater damages than five hundred pounds of tobacco, then the woman to suffer ducking for each five

hundred pounds of tobacco adjudged against the husband, if he refuses to pay the tobacco."

Persons guilty of *blasphemy* in the colonies were punished by having a hole bored in the tongue with a red hot iron, or were branded in the forehead with the letter *B*.

Garroting is a method of execution formerly used in Spain. It consisted in fitting a brass collar containing a screw upon the neck of the victim, and turning the screw until the point entered that part of the brain called the medulla oblongata, producing instant death.

In mediæval times the *rack* was a universal means of torture. It was the favorite instrument of the Inquisition,

and with tyrants generally. The working of this dreadful machine may be seen in the illustration.

The punishments of the ancient Persians were truly dreadful. One was called the punishment of the *boat*. The victim was placed in a small boat and another was



FIG. 94.—THE RACK.

fitted closely over it, leaving his head, hands and feet to protrude. The unhappy man sometimes lived seventeen days. Sometimes his hands and feet were smeared with honey. Then he was devoured alive by maggots.

Bastinado is a mode of punishment known all over the East. It consisted in beating the soles of the feet, or the back with rods.

Cutting off the ears and nose, putting out the eyes, and similar practices were common until a hundred years ago, but to-day are known only among half-civilized or barbarous people. Torture to produce confession of crime was also common in England as it is in China to-day. The tortures used for this purpose in ancient and mediæval times, were numerous, and frightfully severe. The stocks and the pillory were also common methods of punishment in the eighteenth century. The former consisted in an arrangement of pieces of timber through which the feet, hands, or both were thrust and held by a lock. This latter consisted of a wooden frame with holes for the hand and head, and supported on a post.



FIG. 95.—THE STOCKS.
A common punishment of the last century.

Draco was a law-giver of Greece. His laws were noted for their extraordinary severity, punishing the slightest offense with death. Even laziness was deemed a crime, and the lazy man deserving of death. Solon, who succeeded him, modified these severe laws. To this day severe laws are called Draconic Laws.

The Russians have long been noted for their severe modes of punishment. Banishment to Siberia to work in the mines has long been a common practice, especially for political offences. Small crimes were punished by whipping. It is said one mode of punishment was to require the offender to dig a pit so deep he could not get out of it and in the self-made prison to remain until he had fulfilled the requirements of the law.

The most painful of all modes of execution ever invented was that of crucifixion. According to Pliny it was invented by Tarquinius Priscus and came into general use between 260 and 160 B. C. The Greeks seldom crucified persons, but the Romans made it a frequent practice. The hands were commonly nailed, and the feet bound. Sometimes a cross piece supported the feet. The suffering in any case was intense, the nails passing through the palms where numerous nerves would be wounded, the weight of the body drawing upon the lacerated nerves. The intense thirst, the heat of the sun by day and the chill of the night, the attacks of vultures, the irritations of insects and the difficulty of breathing, must all be endured, sometimes several days, before death relieved the victim. Origen relates that Timotheus and Maura, a man and wife who were crucified by the Emperor Diocletian, remained nine days and nights on the cross, and expired on the tenth day.

Boiling alive in oil or water was not an uncommon mode of punishment during the Middle Ages. The victim

was placed in the cold liquid, which was then brought to the boiling point. King John of England invented a mode of punishment which was extremely cruel. The archdeacon of Norwich, having offended him, he was ordered to be encased in a sheet of lead fitted to his body like a garment. The man died of the burden and of horror.

When Richard the Lion Heart started on his crusade he drew up a code of laws for the government of his soldiers. One of the penalties was as follows: "If any one is convicted of theft, boiling pitch shall be poured over his head, and then a pillow full of feathers shall be shaken over it, so that the fellow may be certainly recognized, and he shall be abandoned on the first land where the vessel touches."

The use of dunce caps in school was long a custom. Their use was probably derived from a legal practice. In Germany small crimes were formerly punished by compelling the offender to sit all day on a post in the middle of a canal and wear a tall, steeple-shaped scarlet cap. In Rome, bankrupts were compelled to wear in public black caps of a sugar loaf form.

The Romans punished the murderer of a parent by putting him in a sack along with a cock, a serpent and an ape, and casting the sack into the water. This punishment was used throughout Europe, to some extent in the Middle Ages.



CHAPTER V.

CUSTOMS AND NATIONAL TRAITS (CONTINUED).

HUNTING.

A volume might be filled with descriptions of the various modes of hunting and fighting and the implements of war and the chase, used by different nations. A few only of the more interesting facts can be given here. Savage nations often use great ingenuity in the construction of weapons of offence and defence, and some of them are very curious. The bow has been a weapon of barbarous man from time immemorial, and until the invention of gunpowder, was almost the only means of fighting at a distance.

Three different forms of the bows are shown in the cut. The cross-bow is evidently an improvement on the simple bow, as more accurate aim may be taken and a steadier flight secured. The cross-bow is still used by sportsmen in Italy for shooting birds. An arrow can be propelled with great force and to a considerable distance by means of a good bow. The North American Indians can send an arrow entirely through the body of a buffalo.

Sometimes the arrow point is loosely attached to the shaft so that it remains in the wound. Again the arrow is slightly twisted or so feathered as to give it a rotary motion, thus securing a more steady flight. This idea is carried out in our rifled guns, the bore being spirally grooved to give the ball a spinning motion.

Indians of South America use a *blow gun* which is simply a long tube with a very smooth bore into which is placed a tiny arrow fitting closely and propelled by a vigorous puff of the breath. A similar instrument called the *sumpitan* is used by the natives of Borneo. A man accustomed to its use can propel an arrow seventy or eighty yards. The arrow is too small to do any great execution, were it not tipped with a deadly poison. This use of poisoned arrows is common to many savages.

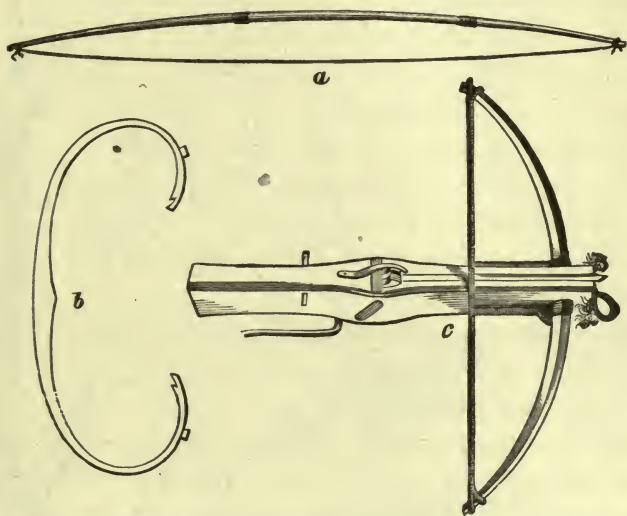


FIG. 97.—*a*: SOUTH AMERICAN LONG BOW UNSTRUNG. *b*, TARTAR OR SCYTHIAN BOW, BENT OUTSIDE-IN WHEN STRUNG. *c*. EUROPEAN CROSS-BOW.

The natives of some parts of South America manufacture a poison very deadly in its nature, known as curare (it is spelled in a dozen different ways, oorari, urari, woorali, curari, etc.). Science has as yet been unable to determine the exact composition of this poison. It is supposed to be a mixture of several vegetable extracts from plants resembling the *nux vomica* from which strychnine is made. The natives have never divulged the secret of

its manufacture. It is not very dangerous if swallowed, but a very small portion entering the blood is followed by death in a very short time. The North American Indians sometimes poisoned their arrows with the virus of the rattlesnake. They obtain it by causing the reptile to bite at a piece of meat or liver held out to it on the point of a stick. The Bushmen poison their arrows with the juices of a certain insect called the "poison grub."

Savages sometimes exhibit great skill and ingenuity in the use of their weapons. Thus the Ottomacs of the Orinoco when they wish to kill a turtle shoot up into the air so that the arrow will fall perpendicularly upon the back of the animal, for they know that a shot in any other direction would glance off from the smooth, hard shell. To calculate the velocity and direction necessary for this requires no small amount of practice.

The Australian *boomerang* may be mentioned as one of the curious weapons. It is simply a heavy stick made with a bend and which, when thrown, will describe a curve in the air and fall near to or behind the thrower. The principle of this instrument may be illustrated by cutting a piece of card board in the shape of the letter L and flipping it from the hand or the surface of a board inclined upward.

The Patagonian captures his game by means of the *bolos*, an instrument consisting simply of two or three heavy balls attached to short pieces of hide thongs. These balls are whirled in the air around the head of the thrower in the manner of a sling, and then flung from his hand with great force. They do not aim to strike the animal

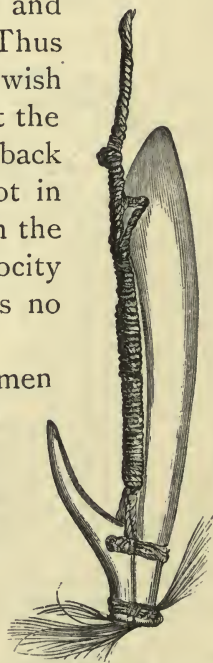


FIG. 98.—SOUTH SEA BONE
FISH HOOK.

with the balls, but have the thongs wrap around its legs and bring it down by completely entangling it in the coils. They can throw the bolasso dexterously as to fasten a man to his horse, or capture a horse without injuring it in any way.

The lasso is used by many tribes to capture game. It is simply a long rope of rawhide made with a running noose which is thrown over the animal's head. Lassos and the bolas are used generally by horsemen, and for the capture of such animals as wild horses and cattle.

Snow shoes are peculiar contrivances by means of which the Indians of the colder parts of North America are able to make rapid progress over the surface of the deep snows, and in this way are able to get within shooting distance of the moose, deer, and bison.

The snow shoes are sometimes about five feet in length and eighteen inches in breadth. After some practice the wearer is enabled to skim rapidly and easily over the sur-

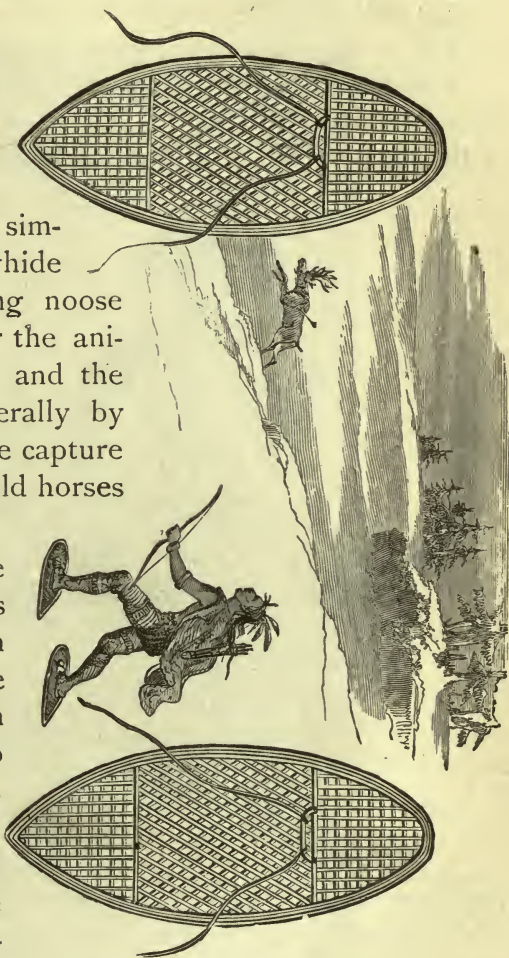


FIG. 99.—HUNTING IN SNOW SHOES.

face of the softest snow, but to a beginner locomotion is not only extremely slow and awkward, but exceedingly painful. They are made of wood and rawhide, light but strong, and fastened to the feet by thongs as shown in the cut.

Savages are close observers of the habits of the animals which they hunt for food, and often take advantage of the peculiar traits of the animals and work strategy in



FIG. 100.—MEXICAN PICADOR.

capturing them. Thus the Indians observe that the bison is not afraid of the wolf but will permit one to come quite close to the herd, so taking advantage of this fact they dress themselves in a wolf's hide and move on all fours imitating as nearly as possible the actions of a wolf until they get within shooting distance of the animals. The Bushman practices a similar ruse upon the ostrich; dressing himself



RAMASES III. HUNTING THE LION 3,000 YEARS AGO, AS DRAWN BY EGYPTIAN ARTISTS.

in the skin of one of these birds he is enabled to approach quite close to them.

The Hamoran Arabs are the most expert horsemen in the world. Two of them mounted on horses will pursue and capture an elephant. They irritate their victim until he makes an attack on them. Then one of them manages to keep just ahead of the elephant and engage his attention while the other rides up from behind, dismounts quickly, runs to the side of the huge beast and makes a deep cut in the leg with his sword. This disables the animal. Then he gets another opportunity and slashes another leg. This brings the elephant down, and he

is then in their power. Such hunting requires extraordinary horsemanship, as well as skill in the use of the sword.



FIG. 102.—ESKIMOS.

Fig. 99 represents a Picador, or horseman, whose duty it is to excite the animal to madness in the famous bull fights

which are characteristic of Spain and Mexico. The men among the Mexicans usually wear richer and more varied costume than the women. It is common to wear white trousers covered with another pair of leather open at the sides and ornamented with rows of silver buttons. The sombrero, or hat, is made of straw or felt, and has a very broad brim with a twisted band of velvet, or of silver lace. A China crape sash is wound around the waist, and the vest is of deer-skin or velvet, with silver embroidery.

The Eskimos are very expert hunters. They will watch patiently for hours by the holes in the ice where the seals

come to breathe, in the hope of spearing one. Capt. Hall mentions a case where an Eskimo sat watching a seal hole two days and a half without either sleep or food, then failing to secure the seal, he went home, ate some food, and returned to renew his watch. They capture the seal sometimes by creeping near and spearing it as it lies asleep on the ice. The seal has the habit of taking very short naps of only a few seconds' duration, and between naps looks around to see if an enemy is near. The Eskimo lies down on the ice and when the seal sleeps, crawls cautiously toward him, but the moment the animal raises his head he stops, begins to paw with his hand and to talk to the seal in a peculiar droning manner. This is supposed to act as a charm. It seems to have the effect of putting the seal off its guard, for the hunter generally succeeds in getting near enough to strike it with his spear.

The principal weapon of the Eskimo is the harpoon. Its construction is peculiar. The shaft is generally made of several pieces of wood, ingeniously lashed together. The head is of ivory, barbed and loosely fitted to the shaft. The head is attached by a short line to the shaft, and the shaft is attached to a long line which the hunter carries coiled in his boat or on his body. When a seal is struck in the water, the head of the harpoon becomes loosed from the shaft. The latter is furnished with a float made of a leather sack filled with air. This is to enable the hunter to find the seal in deep water, for as soon as the animal dies, it sinks to the bottom.

ARMS AND ARMOR.

In the Greek Heroic Age as described by Homer, the sword and spear, lance or javelin were the principal weapons. The sword was double-edged, long and sharp, the blade of bronze and the hilt adorned with gold or

silver. The bow of Pandarus was described as made of ibex horn, and strung with sinews. The arrow points were made of iron, and tied upon the shaft with sinews in the same manner that modern savages fasten their points of flint. The defensive armor was entirely of bronze. In the Greek Historic Age, the principal weapon was a very heavy spear. The mode of fighting was to form the men into solid squares, called phalanges (singular, phalanx) so as to present on every side a front of spears and shields.



FIG. 103.—SOLDIER, TIME OF HOMER.

The Romans used swords and spears, but their characteristic weapon was the *pilum*, or pike, a kind of huge spear, the head of which was usually one-third of the whole length. The head was of iron, and fastened to a wooden handle. It was equally efficient in piercing a shield, and in warding off blows of a sword.

The Egyptians fought mainly with bows and arrows, used by men on foot and in chariots. The archers were provided with a dagger or a battle axe for close combat. Spears, swords, clubs and slings were also used.

The characteristic weapon of the Franks was the battle-axe, which they threw as a missile. It is described as having a broad blade and a short haft, and it is said they rarely ever missed their aim. The early Anglo-Saxons used straight double-edged swords, axes and spears.



FIG. 104.—ROMAN SOLDIER.
See Fig. 47.

The *spear*, or *lance*, is a very common weapon among

savages, and figured greatly as a weapon among all nations previous to the invention of fire-arms. It is either held in the hand or thrown as a dart. The Australians and some others use a "throw-stick;" or instrument in which the spear is placed to be thrown as a stone from a sling. The Australians are very expert in the use of spears. By means of the throw-stick, they can hurl them to the distance of eighty yards.

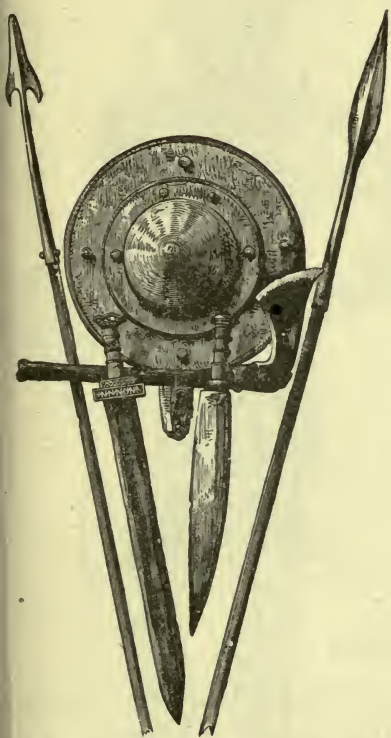


FIG. 105.—ARMS AND SHIELD OF FRANKS, 5TH AND 6TH CENTURIES, A. D.

The shield is a common accompaniment of the spear in warfare, and before the invention of gunpowder, it was common to protect the body more or less by means of armor. Knights in the fourteenth and fifteenth centuries were sometimes so heavily loaded with armor as to be almost unable to walk when dismounted. Armor was made of leather, bronze, or iron. Sometimes, sword breakers, curious implements with springs and notches for catching an antagonist's sword and breaking it, were used.

The horse was also protected by armor so that the skillful knight had a great advantage over poorly armed footmen. In an insurrection at Meaux, France, two knights defeated and dispersed hundreds of the miserable naked peasantry armed with clubs and pitchforks.

Superior size and strength counted for everything in those hand to hand contests. Hence the accounts of heroic deeds and startling adventures incident to ancient and mediæval history. These seem incredible to us because they are now impossible. A small man with a steady nerve and a good rifle is fully equal to his gigantic opponent, except in the bayonet charge.



FIG. 106.—FRENCH KNIGHT, DISMOUNTED,
FULL ARMOR WITH SWORD AND LANCE.

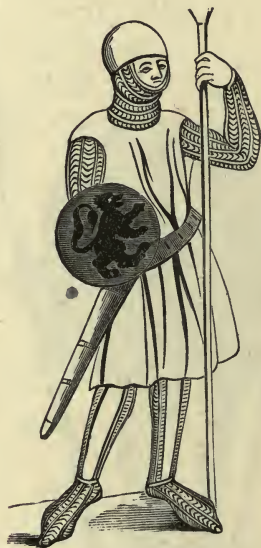


FIG. 107.—SOLDIER, 14TH CENTURY.

FIRE-ARMS.

The hand guns and cannons first in use were curious looking instruments, as our illustrations will show. The first portable fire-arms were fired with a match, which was held in the hand. As an improvement, the match was fastened to a lock. This was known as the match-lock. Afterward was invented the flint-lock, in which the powder was ignited by a spark made by a piece of steel striking a piece of flint. Some of the first hand guns were so heavy that a rest was necessary in firing them.

The Chinese have known the use of fire-arms for ages, but their guns are very clumsy affairs. A weapon pecu-

liar to China is the repeating cross-bow, which, by simply moving a lever backward and forward, drops an arrow into the groove, discharges it, and drops another in its place. With an assistant to supply the arrows, a constant stream of missiles can be sent from the weapon.

Cannons came into use in the fourteenth century. They were first employed by the English at the battle of Crecy, 1347. These guns were very clumsy affairs, and were of little real service beyond the show and noise of the explosion. Stones and marble balls were often used as missiles. These cannons were so rude that they could scarcely be recognized as the antetype of the modern



FIG. 108.—CHARLES THE BOLD IN FULL ARMOR.
(Duke of Burgundy, born 1433).

guns which will send a conical missile through several inches of iron armor at a distance of five miles or more.

Greek fire, a substance the composition of which is not well understood, was used during the Middle Ages with great effect by the Greeks of the Eastern Empire. With it they burned the ships of the Saracens who besieged Constantinople in the eighth century. This fire burned fiercely, and adhered to whatever it touched. Water would not ex-



FIG. 109.—HAND GUN, FIRED WITH A MATCH, TIME OF WARD IV., ENGLAND.

tinguish it. Wine, sand or vinegar quenched its fierceness. The Chinese at the present day use stink-pots for a similar purpose. The stink-pot is filled with noxious drugs, which, on explosion, suffocate the enemy.

The invention of fire-arms entirely revolutionized the modes of warfare. Armor was no longer any defense, as it could not protect the body from cannon balls, and afforded but slight protection from bullets. Before the use

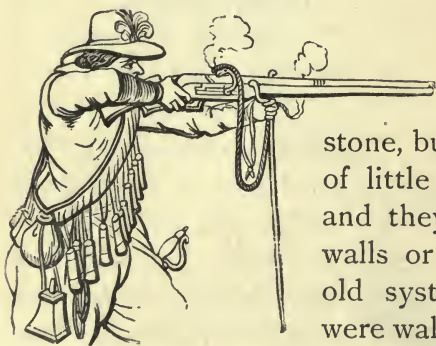


FIG. 110.—MUSKETEER, TIME OF JAMES I., ENGLAND.

of cannon fortifications were high walls which could not be scaled, and strong castles of stone, but these were found to be of little avail against cannon balls, and they gave way to simple low walls or breastworks. Under the old system of warfare, all cities were walled, and the walls must first be breached by means of battering

rams, machines for throwing huge stones, etc. These rams consisted of a huge beam of timber with an iron head shaped like the head of a ram. The beam was suspended by the middle, and swung with tremendous force against the wall; meantime, the besieged

harassed the besiegers by pouring boiling water or oil on their heads, and throwing huge stones down on them. They also lowered sacks of wool, chaff, or any available



FIG. 111.—CANNON 15TH CENTURY

material between the wall and the ram, weakening the blows of the latter. The animosities aroused by this system of warfare were so great, that a decided victory usually ended in massacre, pillage and inconceivable horrors. The improvements in the art of war have lessened its horrors. Wars are now sooner ended, and not nearly so many men are killed as when they fought hand to hand.



ATTACKING A WALL.



BATTERING RAM IN PROTECTING SHED.

TROPHIES OF SAVAGES.

When a North American Indian kills an enemy, he removes the scalp and preserves it as a proof of his victory. The portion taken must contain the crown of the head, or that part where the hair radiates from a center. The size of the scalp is of no importance, but it must contain the crown. Sometimes the entire part covered with hair is taken, again only a very small portion. The scalped man is always supposed to be dead, but sometimes it happens that he is only stunned, and there are cases on record of men who lost their scalps and recovered, living for many years after the occurrence. The number of scalps a warrior can exhibit determines his standing among his fellows.

Analogous to this habit of scalp-taking is the custom of preserving the heads of enemies as practiced by the Dyaks of Borneo, and the Mündrucus of South America. The heads are cut off, carried to their homes, the eyes and brains removed, and the remainder preserved by drying. Pieces of wood painted to imitate the eyes are placed in the sockets, and the dried heads are suspended to the roofs of their huts, presenting a strange scene as the wind sways them to and fro. Such is the passion for the possession of these trophies, that sometimes a Dyak will kill members of his own tribe to increase his number of heads.

BURIAL CUSTOMS.

There are many very strange customs connected with the disposal of the dead, the most of which are more or less connected with religious or superstitious ideas.

The Cherokees and Chickasaws buried their dead under the bed in which they died. The Indians of the

Amazon country bury their dead under their houses. This is the custom also in the kingdom of Bornou, and in other parts of Africa. Among the New Zealanders and the Eskimos, the hut in which the person dies is closed up and converted into a tomb. Among the Aleuts, sometimes the apartment of the house which the deceased had occupied while living, is walled up as his tomb, while the survivors continue to occupy the remainder of the house.

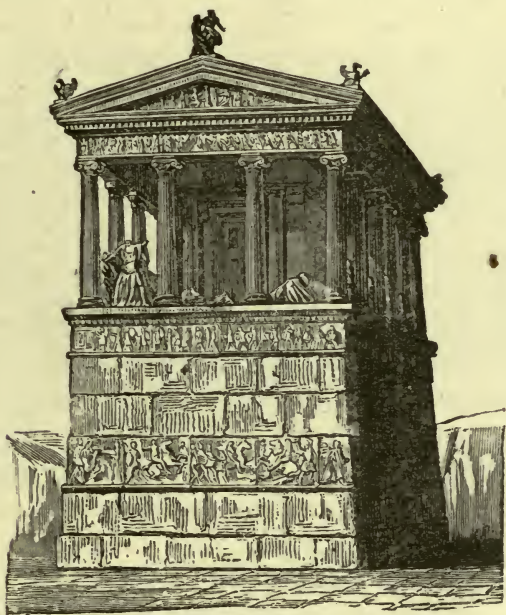


FIG. 113.—GREEK TOMB, FORM OF TEMPLE.

The Navajos of New Mexico and Arizona generally leave a body where the person dies. If it be in a house, they usually close up the dwelling and abandon it. If not in a house, they cover it where it lies, with brush or stones. When the body is removed from the house, it is taken to a cleft in the rocks, and thrown in, and covered with stones, and the house is burned. If they do not

wish to abandon the house, and they think the person is going to die, they take him to some lonely spot, and cover him with brush, and leave him to die. The reason for this is that they think an evil spirit takes possession of the spot where a dead body lies.

The following is a description of the burial custom among the Antis Indians of South America: "When one of their nation dies, his relatives and friends assemble in the abode, seize the corpse by the head and feet, and throw it in the river. They then wreck the dwelling, break the deceased's bow, arrows, and pottery, scatter the ashes of his hearth, devastate his crops, cut down to the ground the trees which he has planted, and finally set fire to his hut. The place is thenceforth reputed impure, and shunned by all passers-by."

Caves and fissures have been used as burial places of the dead, from the earliest times, as not only history, but discovered remains testify. Many savages to-day make use of these convenient places for depositing their dead. Some Indian tribes place their dead in canoes, which they bury in the ground as coffins. Burial mounds of earth, timbers and stones are common all over the world. This mode of burial does not seem to be in use to any great extent at the present day.

The Parsees of India have very peculiar ideas in regard to disposal of the dead. Zoroaster taught them that earth, fire and water ought never to be defiled by contact with putrefying flesh. They therefore erect at great expense upon the tops of the highest hills, immense structures of stone, which are known as "Towers of Silence." These structures are of the hardest black granite, are about forty feet in diameter, and twenty-five feet in height, and so well constructed as to resist for ages the powers of time. The oldest was erected about 200 years ago,

and is used only for a certain family. These towers are built from the ground up of solid stone, except in the center is left an open well, five or six feet in diameter, which leads down to an excavation at the base which is connected with four drains, terminated by holes filled with charcoal. Around the top of the tower is a wall, or parapet, of stone, ten or twelve feet in length. The top of the solid part is divided into seventy-two compartments, or receptacles, which answer the purpose of coffins. When

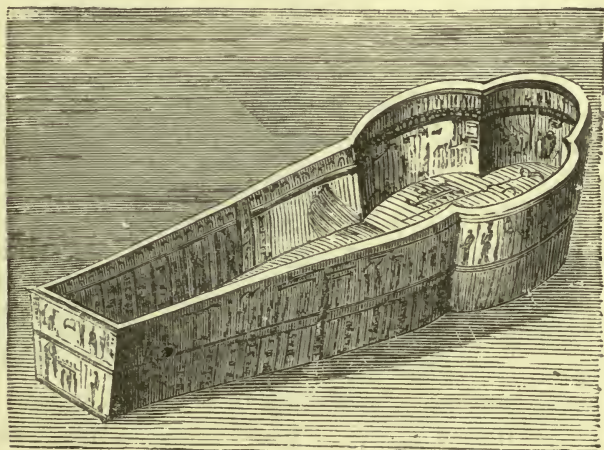


FIG. 114.—OUTER COFFIN OF EGYPTIAN MUMMY.

a person dies, his body is conveyed to this tower, and deposited in one of these receptacles, where, in a very few minutes, the vultures which infest the place in great numbers devour the flesh, leaving nothing but the bones.

No one is allowed to enter these towers, except the bearers of the corpse, nor is any one else permitted to go nearer than thirty feet. The bearers after depositing the corpse, enter a building, change their clothes, and wash themselves, afterward depositing their cast-off-clothes in a stone receptacle prepared for the purpose. In a few

weeks afterward, the bearers return, and with gloved hands and tongs remove the bones from the receptacle and deposit them in the central well, where the bones of generation after generation of Parsees remain commingled for centuries.

The custom of embalming, or mummifying human bodies has been mentioned as characteristic of the ancient Egyptians. It is practiced also by some tribes of savages to-day, especially upon their chiefs, or persons of distinction. It was practiced by the tribes once inhabiting Virginia, the Carolinas and Florida. Bodies have been found well preserved in the saltpetre caves of Kentucky, but it is an unsettled question whether they were designedly prepared, or only naturally preserved by the mineral of the locality. The natives of Alaska and the Aleutian Islands, embalm their dead. The ancient Ethiopians, Persians, Assyrians, and ancient Jews practiced embalming.

There were various methods of embalming. Among the Egyptians, one process consisted in taking out the internal organs, and filling the cavity with certain aromatic herbs, then soaking the body in saltpetre, and finally wrapping in linen cloths. The Persians used wax, and the Assyrians honey to preserve bodies. Alexander the Great was preserved in wax and honey. The Egyptian mummies were carefully inclosed in cases. Many of the mummies, 4,000 years old, are found in Egypt. Flowers and various articles of jewelry, etc., were placed inside the cases. The wealthy classes spent vast sums in embalming. The case was placed in an inner coffin which was placed in another. This was then inclosed in a huge sarcophagus, page 427. All were covered with hieroglyphics.

The deposition of human remains in urns was once a custom with many nations. Some of these urns of

earthenware have been found in our Southern States, in mounds. It is said to have been practiced by the ancient Chaldeans. The urns found sometimes had mouths too small to allow the passage of the skull, hence they must have been moulded over the body.

Cremation, or burning the dead, is a custom of great antiquity. Says a recent writer: "It was common in the interior of Asia, and among the ancient Greeks and Romans, and has also prevailed among the Hindoos up to the present time. In fact, it is now rapidly becoming a custom among civilized people."*

It exists to a considerable extent among the North American Indians. Sometimes the cremation was only partial. An account is given of a burial among a tribe of California Indians where they cut off the head of the corpse, buried the body, and burned the head over the grave.

A race of Indians once in-



FIG. 115.—INTERIOR OF ROMAN TOMB.

habiting North Carolina, had the custom of covering the dead body with a coat of clay, then placing it in the fire until the body was consumed and the clay baked around it in the form of a mould, which was then carefully buried. From the appearance of certain remains it is thought that some of the ancient mound-builders had the same custom.

Cremation has been advocated by some eminent scientific authorities in England and in this country, but so far as I have been able to learn, only two or three cases of scientific cremation are on record in the United States.

*It has been officially authorized by the city of New Orleans.

When bodies were burned, it was the custom to place the unconsumed bones and ashes in urns, and preserve them in their houses, or in places set apart for the purpose.

The custom of burying weapons and other articles with the dead, has a religious significance hinted at in another part of this volume, and is almost universal among the lower tribes. In some cases models only of the implements and ornaments are placed in the grave. In Japan those who wear swords during life have wooden ones placed on their graves. Figure 116 shows a coffin or dead box, of the ancient Greeks, containing vessels of various kinds.

Animals, as horses and bullocks, were sometimes slaughtered when a chief or man of prominence died, and sometimes slaves were put to death on such occasions. Perhaps the

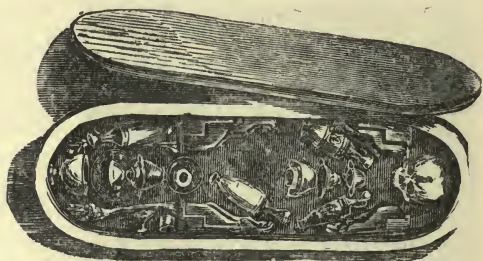


FIG. 116.—ANCIENT GREEK DEAD BOX.

custom sometimes observed among civilized people of leading the horse of the deceased general, or man of rank, in the funeral procession, is but a relic of the time when such animals were sacrificed at funerals. Animals were carefully embalmed by the Egyptians.

The Patagonians kill the horse of the deceased, stuff the hide of the animal and support it upon stakes by the side of the grave. The widows are required to remain secluded from society for a year, blacken themselves with soot, and refrain from eating certain kinds of meat. If a woman were to break this rule, she would suffer death at the hands of her husband's relatives.

Some of the tribes clean the flesh from the skeletons

and preserve them with great care. Among others, the tomb is periodically opened, and the skeleton washed and newly clothed.

Funeral ceremonies among savages are not infrequently accompanied by grand feasts. The Irish wake, where eating, drinking, and carousing are kept up through the night, may be considered as a relic of the savage custom. The same custom existed among the Greeks, and survives to-day in rural districts of the United States.

Among many people low in civilization, persons are hired to do the mourning, and the practice of inflicting self-torture by the survivors is not uncommon. It was once a custom among the Indians of Dakota for the widow to cut off one of her fingers and suspend it from a tree over the grave of her husband.

In China all persons over sixty years of age are supposed to have their coffins ready. They have what are called "Long Life Loan Companies," to which each member pays so much a year, and is entitled to a coffin and grave, to be furnished when he dies. It is common for children to present their parents with coffins on their sixty-first birthday. When a man approaches death he is taken into a certain part of the house to die. His best clothes are brought out and laid by his side, that they may be put on just before he dies. Sometimes costly gems and ornaments of gold are buried with the corpse, and frequently pieces of gold or jewels are put in the mouth of the dead. This resembles the custom of the ancient Romans, who put a coin into the mouth of the deceased, that he might pay his passage to Charon who ferried people over the river Styx in Hades. The relatives of the deceased Chinaman furnish coverlets, two or more of which are put over the body. Sometimes as many as thirty are presented, and those which are not used are

burned that they may be conveyed to the soul in the other world. The relatives do not put on mourning for three days after the death of the person, in the hope that he may be restored to life.

Henry Gilman, in the *Smithsonian Report* for 1875, describes a number of skulls found in mounds in Michigan, each one of which had a hole bored in the exact center of the top, also several arm bones with holes bored in

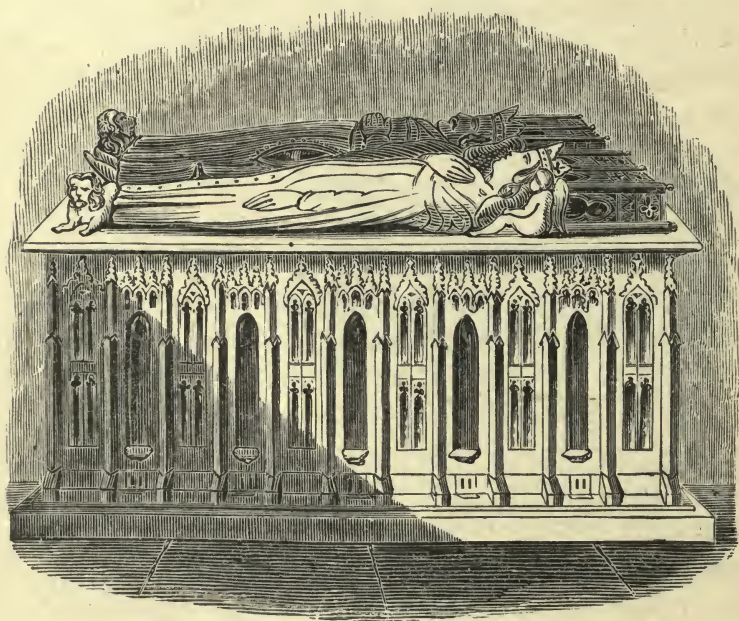


FIG. 117.—TOMB OF HENRY IV. AND HIS QUEEN, (CANTERBURY.)

the lower ends. The writer refers to the discovery of certain skulls found in France, which had been perforated, some before, others after death, and to similarly perforated skulls found in the Canary Islands, and one found among Peruvian skulls. What is the meaning of these singular facts? It is probable that they attributed dis-

ease to an evil spirit residing in the head, and bored these holes to allow the disease to escape. Whatever be the explanation it remains one of the strange facts connected with buried human remains.

Many tribes bury their dead in a sitting posture. The Bongoes of Africa bury in a sitting posture, the men facing the north, the women facing the south.

Some Indian tribes place the bodies of their dead in hollow trees, or logs, or in pens made of poles. Other Indian tribes place their dead upon scaffolds, or fasten them to trees; others again place them in canoes or boxes, which are supported upon posts; again they are deposited in tents, or cabins built for the purpose. Sometimes they are set afloat in canoes upon rivers, and frequently sunk in springs, lakes and other bodies of water.



GREEK CORPSE LYING-IN-VIEW, WITH FRIENDS PRESENTING OFFERINGS.

CHAPTER VI.

CUSTOMS AND NATIONAL TRAITS, (CONTINUED).

EATING AND THE USE OF NARCOTICS—KINDS OF FOOD.

Man is the most omnivorous of animals. There is scarcely a substance possessing nutritive properties in nature, no matter how disgusting it may appear to us, that has not at some time been used as food by man. Even substances which have no nutritive properties, as clay, have been eaten either alone or mixed with food.

Strange to say, the custom of eating clay is not a rare one. "The negroes of Guinea have long been known to eat a yellowish earth there called *cavuac*, the flavor or taste of which is very agreeable to them, and which is said to cause them no inconvenience." When these negroes were carried as slaves to America, they continued the custom of clay eating, but the clay of this country did not seem to agree with them so well as that of their native homes. The custom of earth or clay-eating prevails in Eastern Asia, Island of Java, in Northern Europe, and in the region of the Amazon River in South America.

There is no nourishment in these clays, yet they seem to allay hunger, probably by diluting the food, spreading its nutrient elements over greater surface, and enabling the organs to act upon it more readily.

The habit of eating arsenic is another of the queer practices. As it is well known, arsenic is a deadly poison,

but like other poisons, if a person begins with small quantities, and gradually increases the dose, the system will in time be able to tolerate a comparatively large amount without apparent injury. In some parts of Austro-Hungary, the people all eat arsenic. They get it from the chimneys of the furnaces used in smelting lead, copper, and other ores. They eat it to give plumpness and whiteness to the skin, and improve the breathing, making them long-winded. It is sometimes used by ladies in this country to improve their complexion. It is also used to improve the appearance of horses. When the use of it is discontinued, bad effects result, and the persons are driven to its use again. It is said to produce no serious results if the dose is carefully adapted to the age and constitution of the individual. The amount used varies from half a grain to two grains, two or three times a week.

The Araucanians of South America have a peculiar way of preparing the lungs of sheep for food. They hang up the animal by the fore legs, cut open its windpipe, force in as much salt and cayenne pepper as they can, then cut the jugular vein and turning the end of it into the windpipe, allow the blood to carry the salt and pepper into the lungs. The poor sheep dies in horrible agony. Then the lungs are taken out, cut in slices, and eaten while still warm with the animal heat.

It is said there is not a beast or bird that the Bushman will not eat. Snakes and other reptiles are common articles of diet, and he will eat almost any insect he can catch. White ants and locusts are, however, preferred.

The natives of New Caledonia eat a large spider which is common in their country. When drinking, they dip up the water in their hands and dash it in their faces as much going over their heads as enters their mouths.

The Chippewa Indians search each other's heads and

eat the lice they find there. We are reminded that this is a common habit among monkeys.

In Abyssinia grain is ground between two stones, then made into a thick paste with water, allowed to stand a day or two until sour, then spread upon a slab of earthenware beneath which is a fire. In this way "batter cakes," eighteen inches in diameter are made, and these constitute the principal food. The Abyssinians will not eat the flesh of any animal which has incisor teeth in its upper jaw.

According to Bruce it is a practice to cut strips of flesh from a living cow, taking care to avoid vital parts, and eat them raw while yet warm. Mr. Parkyns, another visitor to Abyssinia, said that he learned to relish a dish prepared by the natives as follows: The liver and stomach of the animal were chopped up and mixed with the half-digested contents of the stomach, flavored with the contents of the gall-bladder, and the whole, well seasoned with pepper, salt and onions, was eaten uncooked.

It is known to every school boy that the Chinese eat dogs, rats, and birds' nests, and regard them as luxuries. The birds' nests are not made of sticks and hair or wool as I supposed from the statements in a school geography which I used when a boy, but are constructed by certain species of swallows from a kind of sea weed. These nests are wholesome and nourishing, but are rather an expensive article, and are eaten only by the rich. They form an important article of commerce, and sell in the Chinese market for prices varying according to quality, from ten to thirty dollars per pound.

Ghee is a kind of clarified butter made usually from the milk of the buffalo, and used in large quantities by the people of India. The butter is produced by churning, and allowed to stand until it becomes rancid, then it is

boiled with a little sour milk and salt, or betel-leaf, and stored in pots for use. It has a peculiar flavor very disagreeable to Europeans.

Flesh is eaten raw by many savage tribes, although it is not by any means a universal custom. The Damaras of Africa will eat the flesh of animals which have died of disease, also the flesh of the leopard, hyena and other beasts of prey, but will not touch food that is not cooked.

The habits of various nations regarding food and its preparation only show that relish for certain dishes is a matter of education. There are many people who cannot eat oysters, tripe, etc., until they learn by making an effort, to overcome their prejudices. Capt. Hall when among the Eskimos found that when he made up his mind to eat whatever the natives ate, he soon came to consider what at first appeared extremely disgusting, to be exceedingly palatable. He could eat with great relish the contents of a deer's stomach, the blood of a seal, or the warm entrails of an animal.

Much more might be said on the kinds of food eaten, but I think enough has been said to establish the statement that man is an omnivorous creature. In regard to the modes of taking food there is almost as much diversity.

A number of Eskimos will sit down and one will take a huge piece of meat, bite off as large a piece as he can, pass it to the next who will do the same, and so on, keeping it going around until it is all consumed.

The Chinese eat solid food with "chop-sticks;" these are two little rods about ten inches in length, and the thickness of a goose quill. They hold one between the second and third fingers, and keep it stationary. The other is held between the thumb and fore-finger of the same hand, and is free to move, acting against the other like a pair of pincers. They use them so adroitly as to

be able to pick up a single grain of rice. Food with them is always cut up into small pieces before it is brought to the table.

The Greeks and Romans reclined on couches while they ate. The left arm rested on cushions, while the right was free to be used in handling the food. The arrangement of the couches and table is shown in the engraving.

The Indians of the Brazilian forests have been seen to thrust a stick into an ant hill and allow the ants to crawl up into their mouths—certainly a convenient way of taking food.

USE OF LIQUORS.

There are many kinds of distilled and fermented liquors in use throughout the world. In Hungary there are as many as four hundred kinds of wine made, and in France there are over a thousand kinds. Alcoholic drinks of some kind are used by all nations, and are made from a great variety of substances, and known under many different names.

In South America cocoa-nut wine is used. It is made by simply burying the cocoanuts in the sand until the milk ferments. The people of

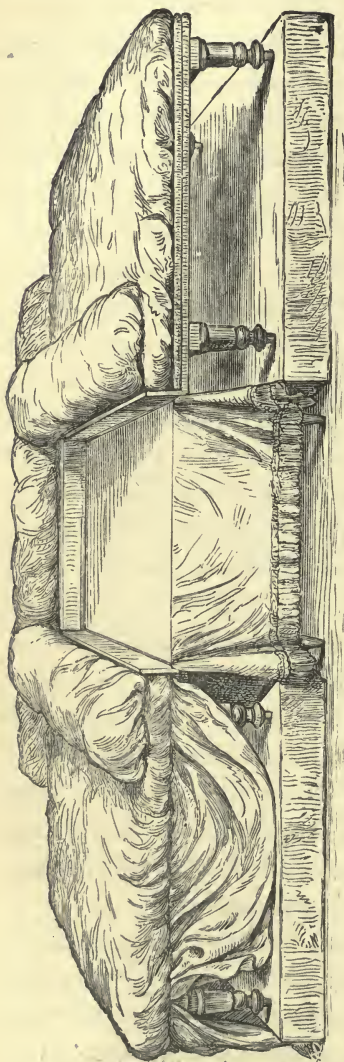


FIG. 118.—TRICLINIA, COUCHES USED BY GREEKS AND ROMANS AT TABLE.

Switzerland and some parts of Germany use large quantities of "schnapps," a kind of brandy made by distilling potatoes. The Hindoos use arrack, a drink made from rice. The Chinese use it under the name "samshoo," and the Japanese "sacio," or "saki." The palm tree affords a drink which is used in Africa, India, South America and Oceanica.

A tribe of South American Indians have a curious method of manufacturing an alcoholic drink. They moisten Indian corn, and allow it to sprout. Then the members of the family and the guests who may be present seat themselves in a circle around a large gourd, and each one begins to chew the sprouted corn, throwing the masticated mouthfuls into the gourd, until a quantity is obtained. It is then mixed with hot water and allowed to ferment. The saliva changes much of the starch to sugar, which ferments, and produces the alcohol.

The Tartars get drunk upon fermented mare's milk. They call this drink koumiss or "milk-beer." The Mexicans make a drink called pulque, from a species of century plant.

In England nearly all classes drink alcoholic liquors in some form. The question of prohibition is now being seriously discussed. In the time of James I., drunkenness was punished by fines and the stocks, but in 1828 the law was repealed. In Scotland there has been an improvement during the last fifty years among the upper classes in regard to temperance, but among the lower classes, intemperance is on the increase. Fifty years ago, "funerals and weddings, minister's meetings and church going, and every important or unimportant public or private act needed whiskey to make it successful."

The Irish are very intemperate. The average annual cost for liquors in Ireland is fifty dollars for each family.

In some parts ether is used as a substitute for whiskey.

The people of Denmark use mostly the milder drinks, as beer, and while a large quantity is consumed, intemperance is rare. Temperance reform is not agitated. Russians are very intemperate. Holidays are numerous, and on these occasions drunken men may be seen in great numbers staggering about, or lying in a helpless state. Sweden has very severe laws against drunkenness, yet they do not seem to check the vice. A man is fined for the first offence three dollars, for the second six, for the fourth twenty dollars, for the sixth he is condemned to a year's hard labor. The tavern keepers are obliged to keep these laws posted up in their houses ; and they are read several times a year from the pulpit.

"A man or woman of any order of society in Prussia, who totally abstains from wine or beer would be very hard to find." Yet it is said the number of drunkards is very small. The Italians use large amounts of wine, but it is usually so mild and used so temperately, that very little intoxication is seen. Wine is universally used in France, but as in Italy, with little attendant intoxication. The people of Spain drink to excess wine and whiskey, but the effect seems to make them indolent, and does not dispose them to crime.

In Greece the native wines are very cheap, only three cents a bottle, and are used by all classes and ages. The Greeks are said to be among the most temperate people in the world, that is, there is the least number of drunkards. Drunkenness is rare in Mohammedan countries, as Turkey and Egypt, because the use of wine is forbidden by the Koran. Drunkenness is considered a great reproach in Brazil, and is of rare occurrence.

Our own country presents a phenomenon unknown in any other part of the world—a large proportion of the

population who are total abstainers from intoxicating drinks. Drunkenness is generally looked upon with abhorrence by the more intelligent class of people, and greater efforts are being made in the line of temperance reform. Yet among those who do partake of intoxicants, there are more who drink to excess, and the amount of crime attributable to drink, is perhaps greater than in any other country.

Says Dr. Geo. M. Beard: "The energetic, courageous Northern people when drunk are savage, ugly, brutal, and inclined to swear, stab and murder; the timid, indolent, and easy Southern people when drunk are jolly, lively, gay, and garrulous. Herein we find the explanation of the paradox that intemperance is most frequent and most destructive among the most powerful, the most civilized, and the most cultivated nations."

There seems to be an almost universal liking for warm drinks. It prevails equally in hot and in cold countries. In Central America, chocolate is the favorite beverage. In South America, Mate, or Paraguay tea, is the common drink. The tribes of North American Indians have been addicted to the use of various kinds of tea—as Labrador, Oswego, and Appalachian teas. Coffee is the favorite drink in France, Germany, Sweden, Turkey, and the southern part of the United States; while in Russia, Holland, England, Canada, and the Northern States of our Union, the tea of China is mostly used. In Spain and Italy, large quantities of chocolate are consumed.

At the present time there are three billion pounds of tea produced annually, forty million pounds of which are consumed in the United States. Chicory is a root used to a great extent as a substitute for coffee. Many persons think a moderate quantity of it improves the flavor of coffee. Peas and beans are used for the same purpose.

NARCOTICS.

One of the most widely diffused narcotics is tobacco. At present four billion pounds of tobacco are produced annually, or nearly four pounds for each human being. In India, both sexes and all classes smoke, and in Turkey, although the priests and sultan once declared it a sin against their religion, the pipe is a constant companion among all classes. "The Siamese chew moderately, but smoke perpetually." In Burmah, even infants three years old smoke cigars. In China every female above the age of eight, carries a pocket in her dress to hold her pipe and tobacco. "In Europe, from the plains of sunny Castile to the frozen Archangel, and from the Ural to Iceland, the pipe, the cigar and the snuff-box, are a common solace among all ranks and conditions of men."

Comparatively few women of our own country to-day use tobacco. Formerly it was common to see the pipe in the mouth of women, especially of the laboring classes. Among the lower classes in the South, especially before the war, a great many women used tobacco, sometimes chewing it, sometimes smoking it in pipes, and again in the rather odd way of dipping a moistened stick in snuff and rubbing it upon their teeth.

Opium is used by about four hundred millions of people, chiefly in China and India. It is there both eaten and smoked. In this country opium eating seems to be on the increase. It is estimated that there are one hundred and fifty thousand habitual opium eaters in the United States. Many form the habit by using it as a medicine. Opium smoking was first introduced among Americans in 1868 by a sporting character in San Francisco. The practice soon spread, and in 1875 a law was passed against it, but without avail to check its progress, and to-day there are as many as six thousand opium

smokers among our American citizens. It is practiced only in our large cities.

Indian hemp is a plant which grows in India, Persia, Arabia, Africa and Brazil. It is used by the Hindoos, Hottentots, Bushmen, Moors, and the natives of Brazil, as an intoxicant. It is either smoked or prepared with butter and spices, and eaten under the name of *hasheesh*. According to estimates, it is used by three hundred million people. The Mohammedans are forbidden by their religion to use wine, but find an agreeable substitute in *hasheesh*.

As many as ten thousand people in South America use *coco*, a vegetable narcotic, growing in tropical countries. One hundred thousand people in Asia and the Indian Islands use the *betel nut*, the seed of a species of palm. Besides its intoxicating effect, it gives a deep red color to the mouth, teeth, and lips. The Turks use to some extent, the seeds *Syrian rye* as an intoxicant. *Bull's Hoof*, sometimes called the "Dutchman's laudanum," is used in Jamaica. The seeds and leaves of the thorn-apple, of which there are several species, our common "Jimson weed" being one of them, produce a peculiar intoxication in which the person nearly always has furious delirium, imagining he sees all kinds of apparitions. The Indians of the Andes use the thorn-apple, claiming that it enables them to see the spirits of their ancestors. In Germany and France, the seeds of our common jimson weed are, it is said, used frequently for the perpetration of crime. In Russia beer is made more intoxicating by adding the seeds of the thorn-apple.

The natives of Siberia and Kamtschatka use as a narcotic, a species of mushroom. Its effects are said to be peculiar, a talkative person under its influence being unable to keep silent, one fond of music continually sings,

and objects appear to the person greatly enlarged, so that if he would step over a straw, he takes a step sufficient to clear a large log. The natives of Siberia have discovered that the urine of the intoxicated person has the same intoxicating quality. Hence, when there is a scarcity of the fungus, they drink their own urine, and thus keep under the influence of the same dose of the drug for a long time. By this plan a small quantity will keep a man drunk a week.

STRANGE REMEDIES.

One can scarcely mention a substance which has not at some time been used as a medicine; it is only at a comparatively late date that physicians among civilized people have come to the conclusion that disease is not an entity, a something which takes possession of the body, and must be driven out. The savage regards disease as an evil spirit which must be expelled. This idea lingered long among civilized people, at length gradually assuming different forms. It was not a spirit, but some kind of obstruction which could be driven out or neutralized by various strange substances used as medicines. The more disgusting and distasteful the substance, the more likely it was to be chosen as a remedy. The notion that medicine to be effectual must have a bad taste is still very prevalent among the people, even in our most enlightened communities. A prescription of a physician prior to the seventeenth century reads very strangely to-day.

Sir Theodore Mayerne, a noted physician of England, recommended for hypochondriacs what he called his "Balsam of Bats." It consisted of parts of bats, adders, sucking whelps and earthworms, mixed up with hog's grease, the marrow of a stag, and the thigh bone of an

ox. He was also fond of prescribing pulverized human bones as medicine.

The following recipe is from an English work of two hundred years ago: "Take of the flesh of a sound young man, dying a natural death, about the middle of August, three or four pounds. Let the flesh be taken from his thigh or other fleshy parts. Put it into a fit glass, and pour upon it spirit of wine. Let it stand so three or four days. Take out the flesh and put it upon a glass plate, and imbibe it with spirits of salts. Let it stand uncovered, but in the shade, where no dust or other filth may fall upon it. Be sure you often turn it, and, being well dried, you may put it up in a fit jar, and keep it for use." This mixture was said to produce wonderful effects both in preserving and restoring health.

Pearls, gold and precious stones were used by the rich previous to the eighteenth century, under the notion that the costliness of a remedy was indicative of its healing power. Avenzor recommended emeralds to be tied upon the stomach in cases of dysentery.

An English physician introduced the practice of treating small-pox patients by wrapping them in scarlet cloths and hanging the room with scarlet curtains. One of the sons of King Edward I. was treated in this manner with successful results.

Bed-bugs and almost every other kind of vermin have been used as medicines. Dunglinson's Medical Dictionary, a standard work among physicians to-day, speaks of bed-bugs as medicines, stating that not long ago two or three bed-bugs taken at a dose were considered as a sure cure for ague. If the reader will turn to his Shakespeare, and read the scene describing the witch's cauldron in Macbeth, he will see enumerated some of the articles used as medicines in Shakespeare's time.

Even in our day, and in this country, we may occasionally find physicians using some strange remedies, the use of which originated in some superstitious notion of the past. The virus of a certain poisonous reptile is diluted and used quite frequently to-day by a certain school of physicians. I know a young physician who a few years ago having killed a fox, dried and pulverized its lungs, and was trying the powder as a remedy for asthma. I have heard my father relate that when he was a young man, it was recommended to him to drink a pint of his own urine as a sure cure for ague.

AMUSEMENTS.

The Chinese, everything considered, are perhaps the queerest people on the earth. Their customs are all peculiar and widely different from ours. In this country only children amuse themselves by flying kites, but in China kite-flying is indulged in by both old and young, principally as an amusement, but also under the supposition that kites carry away any evil influences which may be impending over the family. The kites are made of various shapes and sizes, resembling birds, insects, serpents, ships, men, and baskets of flowers. Cricket fighting is another queer custom indulged in by the Chinese. Crickets are caught, carefully fed, and kept for this purpose. When a cricket has won many victories, it is called *shouli*, or conquering cricket, and when it dies, is buried in a silver coffin. Heavy betting is done on these cricket fights, the stakes sometimes being very large. Quails and pigeons are also trained to fight for the amusement of spectators.

Falconry, or hawking, is a species of amusement not practiced to any great extent to-day, but which was at one time very common in various parts of Europe and the East. It consists in hunting birds, such as pigeons,

ducks, partridges, and herons by means of trained hawks, or falcons. The sport is of ancient origin, having been traced back antecedent to the Christian era. In Germany at one time, kings and nobles seem to have devoted a greater part of their time to this amusement. In England after the Norman Conquest, the rank of the person was indicated by the particular species of hawk carried on the wrist. The sport declined in Europe in the eighteenth century. At the present time an effort is being made to restore it in England. In Persia, India and other Eastern countries it is still practiced.

Theaters are supposed to be an invention of the Greeks. Their first performances were very rude, the



FIG. 119.—SCENE FROM GREEK COMEDY.

actors were always grotesquely masked. In fig. 119 Hercules is presenting two imps (Kerkopes) in baskets to the ruler. The ancient Egyptians were fond of buffoonery as shown by their pictures, but they do

not seem to have had public shows, or anything resembling stage performances.

The later Greeks and Romans carried the dramatic art to a higher state of perfection. Their theaters were among their grandest buildings. They were not constructed with galleries like our modern theaters, but with concentric rows of seats rising one behind and above the other, like steps of a stairway. Sometimes these seats were cut in the solid rock, in a place where the natural slope and curve of the ground rendered this easy. The largest of the Roman theaters was the Coliseum, which, though a mass of ruins to-day, still shows evidence of its former grandeur. It is said to have had a seating capacity of 87,000 seats.

Dancing is a favorite amusement among nearly all savage tribes, as well as civilized people. In many cases it is connected with religious ceremonies, as indeed were theatrical amusements among the ancients. The Aponos of Africa have what is called the Giant Dance. One man personates the giant by getting up on stilts, which are concealed by long flowing robes. He wears a hideous mask, and in this disguise performs the movements of the dance.

The Hottentot girls have a singular dance which is called the Melon Dance. A number of girls assemble and choose one for a leader. The leader takes a small melon and begins to run in a circle, making various strange movements with her arms and legs. The others are to imitate her motions. When she thinks she sees one of her companions not on her guard she tosses the melon to her. This one must catch the melon without stopping her movements, and throw it to another in the same manner.



FIG. 120.—GREEK DANCING GIRL.

Games of chance are common among almost every nation, savage or civilized. The savages often gamble with small black or white stones, or bits of bark or wood. The Chinese are a nation of gamblers. The ancient Egyptians had many kinds of games, as shown by the drawings among their remains. Ball-playing was a common game among them, as it is among both savage and civilized people to-day.

Bull-baiting is a sport which was once very popular in England, but to-day is known only among the lowest classes. It consisted of setting dogs upon a bull who was sometimes made furious by blowing pepper into his

nose. King James I., it is said, was very fond of this sport. Bull-fighting, or the combats of men with bulls was a favorite sport in ancient Greece and Rome, and is to-day the national sport of Spain and Mexico. In Madrid the bull-fighting season is from April to November,—at least one afternoon of the week being devoted to the sport. The fights occur in a ring or circus surrounded by elevated seats to accommodate ten thousand or more persons who pay a large price for admission. The animals are excited to madness in various ways and killed by dexterous thrusts of the sword. It rarely happens that men are killed in these combats.

Kings, noblemen, and wealthy men from very ancient times, to within the last century kept a class of persons



FIG 121.--DANCE OF FOOLS, 13TH CENTURY.

whose business it was to amuse the company, particularly at table by their jokes and witty sayings. These men were called *fools*. They were not fools in the sense we use that word to-day, but on the contrary they were generally men of talent. The clowns of our circus shows are the modern representatives of the court fools of the past. The fools dressed in outlandish costumes just as our clowns do to-day. Nearly all of Shakespeare's plays contain impersonations of the court fool. It has been said that Shakespeare's fools are his wisest characters. In this the great poet has only been true to nature, for in many instances the court fools were men of the great-

est ability. A few whose jests have been printed, and who attained a historical reputation, were Triboulet, jester to King Francis I. of France, Klaus Narr in the Court of Frederick of Prussia, and Scogan, the court fool of Edward IV. of England. The engraving represents the costume of court fools in the thirteenth century.

Music has been a popular means of amusement in all ages, and among all nations. Even the lowest savages have some means of producing rude music. The ancient instruments were chiefly stringed instruments, reed instruments, and instruments to be beaten as drums, cymbals, etc. The elevation of music to a fine art, and the devel-



FIG. 122.—EGYPTIAN BAND 4,000 YEARS AGO.

oping of its unlimited resources belongs to modern times. The beautiful symphonies of the present produced by bands of twenty to sixty pieces were unknown to the ancients, and could not have been produced by their instruments. The antiquity of *bands* is attested by the accompanying engraving of an Egyptian band as pictured by their own artists.

ATHLETIC SPORTS.

Boxing, wrestling, foot racing, horse racing, leaping, throwing weights, etc., were common amusements among the Greeks and Romans. In the arenas of the theaters

men sometimes fought with each other, and with wild beasts for the amusement of other people. Those who fought in the arena were called gladiators, from *gladius*, a sword. The gladiators were usually slaves who had been originally prisoners taken in war. They were bought and trained for the purpose by men who made this their business. The gladiators were armed with swords, and fought hand to hand. These exhibitions were sometimes carried to great extremes. Julius Cæsar gave a show where three hundred and twenty couples met in deadly



FIG. 123.—GLADIATORS.

encounter. Trajan gave one which lasted one hundred and twenty-three days, and in which two thousand men fought with each other, or with wild beasts for the amusement of seventy thousand people assembled in the Coliseum.

The gladiators were compelled to fight until one or the other was killed. If they showed cowardice, they were put to death by torture. When one of the combatants was disarmed or down, the victor looked to the people, and if they turned their thumbs down, it was the signal of death and he must execute the order, but if they turned their thumbs up, he must spare his foe. The

victors were sometimes awarded their freedom, at other times only presented with a branch of palm. The cut (fig. 123) represents a fight between men and wild beasts. It is a copy of an ancient bas-relief. Sometimes animals were made to fight each other. Pompeius gave a show where five hundred lions, eighteen elephants, and four hundred other ferocious beasts were turned loose in the arena, and fought each other. Caligula arranged a fight between four hundred bears and four hundred other wild animals. The animals were first made furious by hunger or fire, and then turned into the arena together.



FIG. 124.—GLADIATOR ATTACKING A TIGER WHICH IS LEASHED TO A BULL.

The natives of Vancouver's Island indulge in a kind of theatrical exhibition in which the pretended drawing of blood forms a prominent feature. A man is stripped and bound with his hands behind him and driven about at the end of long cords. The chief suddenly dashes into the crowd, and seeing the man, rushes at him with a huge knife, and apparently plunges it into his body, while the blood flows in great streams. The man pretends to stagger, fall, and die. His friends gather around him, but to the astonishment of the stranger he gets up, washes himself, and puts on his blanket. The red liquid which is used to imitate blood is made of a red gum, resin, oil and water.

MODES OF SALUTATION.

The Monbottoes of Africa hold out the right hand, and crack the joints of the middle fingers. The Niam-niams, another African tribe, salute by hand-shaking, but

they grasp the hand so tightly that the two middle fingers crack.

Among the Balandos of Africa, when a man of low rank meets a superior he falls upon his knees, picks up some dirt and rubs it on his arms and chest, and then clasps his hands until the superior has passed. A tribe of New Guinea have a very ludicrous way of saluting. They pinch the end of the nose with the thumb and finger of the right hand, while at the same time with the

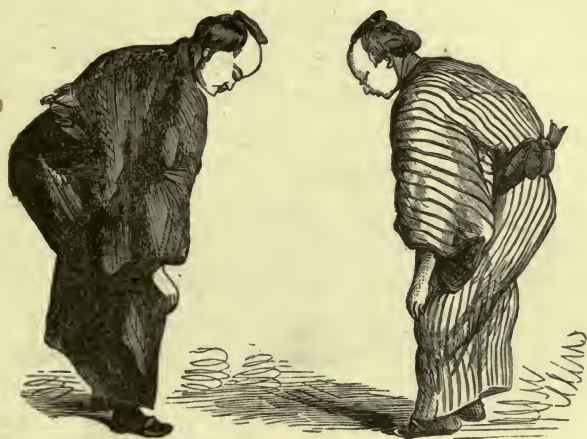


FIG. 125.—JAPANESE SALUTING.

left hand they pinch the stomach. The Eskimos salute by rubbing noses together. The Lapps press their noses together forcibly.

My readers will not admire the following mode of salutation. I give it in the language of a traveler. Speaking of a chief of the Nuehrs of Central Africa, he says: "Grasping my right hand and turning up the palm, he quietly spat into it, and then, looking into my face, he deliberately repeated the process."

In New Zealand when two friends who have not seen

each other for some time meet, they cover their faces except one eye, squat on the ground, and begin to cry. Having continued to weep for some time, they approach each other, press their noses together a little while, uttering a series of short grunts.

Men of distinction in Japan wear over their shoulders a scarf, the length of which regulates their rank. When two of these gentlemen meet, they bow until the ends of the scarf touch the ground. The one who wears the longest scarf, therefore, has the least distance to bow.

In some parts of Germany it is the custom for the gentlemen to kiss the hands of all their lady acquaintances when they meet. The Italian gentlemen also frequently kiss the hands of the ladies. Among the Romans it was once customary to pick up children by the ears and kiss them. The Bohemians sometimes kiss the garments of those they wish to honor. The Arabs are very ceremonious. When persons of distinction meet, they embrace, kiss each other's cheeks, and then kiss their own hands. Women kiss the beards of their husbands, and children kiss the beards of their fathers.

MODES OF CONVEYANCE.

A contrivance similar to that represented in the engraving is in common use to-day in China and Japan. Sedan chairs were similar vehicles said to have been invented in the town of Sedan, France. They were in common use in France and England during the time of Charles I. It is said that the Duke of Buckingham, during the reign of James I., gave great offense because he used this mode of conveyance, the people remarking that he used his fellow men as beasts of burden.

These chairs were in use in cities in England, one hundred years ago, especially for carrying persons in full

dress to public and private entertainments. They are seldom used in civilized countries to-day, except for invalids. In India a more comfortable vehicle than that represented in the cut is used. It is constructed upon the same principle, but is long enough to permit the traveler to lie at full length, It is called the *palanquin*. It is also used in Brazil. The Romans used a similar vehicle called a "*litter*."

The Laplander glides over the snow at the rate of nine or ten miles an hour in his reindeer sledge. The Eskimos hitch seven or eight dogs to a sledge, and travel at the rate of twelve or fourteen miles an hour. The dogs are guided by the voice of the driver, and by a long

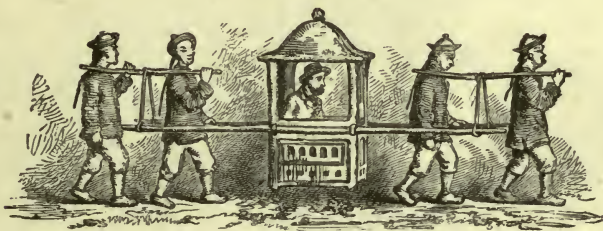


FIG. 125.—SEDAN CHAIR.

whip which he throws at the side of the leader. When he wishes to stop he utters a cry similar to our "whoa," and throws the whip across the backs of the dogs who will crouch down in the snow, and remain even for hours in the absence of the driver. Sometimes the dogs are very quarrelsome and snap at each other as they run, and occasionally a general fight occurs in which the whole team become almost inextricably tangled up in the harness. These animals have wonderful powers of endurance. They remain unhoused when the temperature is from thirty to forty degrees below zero, and are poorly fed, being content to subsist mostly upon bones of fish and seals,

and pieces of hide which their owners cannot use. Their owners are obliged to keep their clothes, which are of skins, out of reach of these animals, or they will devour them. Captain Hall tells of one dog eating a whip-lash thirty feet in length. A team has been known to travel seventy miles without stopping for food, and return apparently as fresh as when starting.

Travelers are sometimes conveyed over the Andes Mountains in chairs strapped to the backs of natives. The picture of the Indian family moving, explains itself.



FIG. 120.—INDIAN FAMILY MOVING

The mode of conveyance adopted by the "Noble Red Man," with the pipe in his mouth, will excite a smile in spite of the feeling of pity one would have at sight of the women bearing the burdens.

The boat of Eskimos is also a queer contrivance. It is about twenty-five feet in length, yet so light that the owner can carry it on his head over the land. It is made by stretching skins over a very light frame-work of

wood. In the middle is a hole just large enough to admit the body of the owner, and when he gets in he draws the skins around him so that the boat is made perfectly watertight. It is propelled by a double paddle held in the middle and used by giving a stroke first on one side, then on the other. The paddle also serves as a balance; as the boat is so narrow, if it were not for the dexterous management of the rower, it would turn over. They are very skillful in the use of the paddle. Sometimes to show their dexterity, one man will keep his boat still by balancing, while another one will, by powerful strokes, send his boat fairly over the first one. Sometimes a rower will turn himself and boat completely over, burying himself under the water, and emerging again to assume the upright position.

The Japanese are poor horsemen, and horses are not used by the wealthiest classes who prefer being carried in sedan chairs. They do not use the bridle reins so much for guiding the horses as for holding themselves on. They do not shoe their horses with iron but with plaited straw. These straw shoes soon wear out, so that when a man undertakes a journey, he must take with him a supply of shoes. Distances are often roughly estimated as so many shoes.

In Afghanistan, a number of bullocks' hides are inflated, lashed together, and covered with timbers, thus forming a huge raft which is used as a common mode of conveyance.

The city of Venice, Italy, is, as every schoolboy knows, built upon a number of islands, and the streets are canals, the water coming up to the houses. Here we shall see no carriages, but the people are conveyed from one part to another in boats called *gondolas*.

The jaunting car of Ireland is so well known as to

need no description. In India bullock carts are much used. In the large cities the wealthy classes ride in them.



FIG. 127.—BULLOCK CART.

Some of these turn-outs are gaudily trimmed. For a long time the bullock drivers formed a separate caste.

TRIAL OF ANIMALS.

According to the ancient Jewish law, "If an ox gore a man or a woman that they die, then the ox shall be surely stoned, and his flesh shall not be eaten." In Europe in the thirteenth, fourteenth and fifteenth centuries, animals were regularly tried, condemned and executed for killing human beings, as the following cases will show: In 1266 a pig was burned near Paris for having devoured a child; in 1386 a judge at Falaise condemned a sow to be mutilated in its leg and head, and then to be hung for having killed a child, and it was executed in the public square, dressed in man's clothes. In 1389 a horse was tried at Dijon, and condemned to death for having killed

a man; in 1499 a bull was condemned to death at Can-roy for having in a fury killed a boy.

During the persecutions of witches at Salem, New England, in 1694, a dog was found guilty of witchcraft, and was hung.

NATIONAL PECULIARITIES.

We often hear certain mental peculiarities spoken of as being characteristic of certain nations or races, and we are led to think that each race or nation has its well-marked mental characteristics by which we may distinguish them from each other. I am inclined to think that these peculiarities are not so well marked as is generally supposed. Yet it is difficult to ascertain the exact truth in this matter. There is such a diversity among the individuals of the same nation that it is difficult to generalize. We see great diversity even among members of the same family. Again, observers of these facts do not agree among themselves, and often a peculiarity is exaggerated through prejudice, or from a desire for rhetorical effect.

The following opinions are from Kant, the great German philosopher, given in the language of Thomas De Quincey, the eminent English writer: "Among the nations of our quarter of the globe, the Italians and the French are in my opinion those who are most distinguished for the sense of the beautiful—the Germans, the English and the Spaniards, for the sense of the sublime. Holland may be set down as a country in which neither feeling is very observable. * * * The Spaniard is serious, reserved, and punctiliously faithful to his word. There are few more upright merchants in the world than the Spanish. The Spaniard has a proud soul, and more sympathy with grandeur in actions than with those

qualities of action, which come more under the title of the beautiful. Not much of benignity or gentleness is to be found in his composition ; and hence he is often harsh and cruel. * * * The Italian seems to have a mixed temperament, composed partly of the French, and partly of the Spanish. * * * The Frenchman in regard to all moral feelings, has a domineering sense of the beautiful. He has fine address, is courteous and obliging. * * The Englishman at the commencement of every acquaintance is cold and reserved, and toward all strangers is indifferent. He has little inclination to show any complaisance or obligingness in trifles ; on the other hand, when he feels sincere friendship, he is disposed to express it by important services. He gives himself very little trouble to display wit in conversation, or to recommend himself by any politeness of manner ; on the other hand, his demeanor expresses high good sense and sobriety of mind. * * * The sensibility to honor is in the Frenchman, vanity ; in the Spaniard, arrogance ; in the Englishman, pride ; in the German, haughtiness ; in the Dutchman, pomposity."

Of certain other nations he speaks as follows: "If we throw a hasty glance over the other quarters of the world, we find the Arabs the noblest people of the East, but of a temperament in respect to taste which tends much to the barbaresque and the unnaturally romantic. The Arab is hospitable, magnanimous, and observant of his word ; but his fictions, and his history, and his whole feelings are veined and colored with the marvelous. His inflamed imagination presents objects in unnatural and distorted images ; and even the propagation of his religion was a great romance. If the Arabs are as it were, the Asiatic Spaniard, the Persians are the Asiatic Frenchmen. They are good poets, courteous, and of tolerably

refined taste. They are not rigorous followers of Islam ; and they allow to their own voluptuous tendencies a pretty latitudinarian interpretation of the Koran. The Japanese may be regarded as the Englishmen of the Oriental world ; but hardly for any other qualities than their firmness, which degenerates into obstinacy, their courage, and their contempt of death. In all other respects they show few marks of the grand English style of mind. The nations of India discover a domineering taste for fooleries of that class which run into the barbaresque. Their religion is made up of fooleries. * * What senseless fooleries are involved in the prolix and elaborate compliments of the Chinese! Even their paintings are senseless, and exhibit marvelous forms that are nowhere to be seen in nature. * * * *

“The negroes of Africa have from nature no feeling which transcends the childish level. * * * Amongst all savages, there are no tribes which discover so elevated a character as those of North America. They have a strong passion for honor, and whilst in chase of it, they pursue wild adventures for hundreds of miles ; they are exceedingly cautious to avoid the slightest violations of it when an enemy as stern as themselves, having succeeded in making them prisoners, endeavors to extort from their agonies signs of weakness and of fear. The Canadian savage is veracious and upright. The friendship which he contracts is as romantic and as enthusiastic as anything which has descended to us from the fabulous times of antiquity. He is proud in excess, is sensible of the whole value of freedom, and even through the period of education he brooks no treatment which could subject him to a degrading submission.”

Charles Loring Bruce in describing the French, says : “In character and genius, the French show the evidences

of the three powerful races who have constituted the nation—traits which sometimes seem contradictory, and which only those closely familiar with the French people can understand.

“In their brilliant martial character, their love of display and *effect*, their sudden enthusiasms and as easy discouragement, their readiness to be ruled by military leaders, their fondness for ornament and art, their gayety, fickleness and amorousness, they are thorough Kelts, such as their ancestors have been in all ages; but in the sober devoutness of a large mass of the people, in their seriousness, in their personal sensitiveness and personal independence, in their spirit of skeptical inquiry and the thoroughness of their scientific research they are Teutons, while their wonderful talent for organization and their tendency to centralizations are Roman.”

Americans have hardly had time yet to develop a national character. We as a nation are made up of blood from many sources, but mainly from the Anglo-Saxon, and our character approaches that of the English. We are an active, restless, nervous people, full of enterprise, with great inventive genius, fearless, radical, and aggressive. We may be said to possess all the qualities of the nations of the Old World combined and modified.

The following points in regard to the mental characteristics of the principal nations of the past and present are taken mainly from a recent work on temperaments by D. H. Jacques, M. D.

The ancient Greeks were an intellectual people, a nation of artists, poets, orators and philosophers, but lacked somewhat in moral sentiment and lofty spiritual purposes. The Romans were less intellectual than the Greeks, but more courageous and domineering, with a strong love of law and intense patriotism.

The Semitic races, comprising the Phœnicians, the Arabians, the Assyrians, the Chaldeans, the Egyptians and the Jews, are characterized by strong religious character and tendency to commercial pursuits.

The high caste Hindoos are intellectual and especially inclined to metaphysical speculation. They have great veneration.

The Scandinavians, including the Danes, Swedes and Norwegians, the fair-haired and blue-eyed people of the North, are active and practical in their tendencies. This race has furnished us some world-renowned characters in various fields, as Charles XII. in war, Linnæus in science, Jenny Lind and Christine Nilsson in song, Frederica Bremer and Hans Christian Andersen in literature, and Ericsson in applied science.

The German is slow, patient and plodding, a profound thinker, fearless investigator, inclined to skepticism, often making discoveries, yet failing to make practical applications of them.

In the language of Dr. Jacques, the Frenchman "is tasteful in dress; a model of politeness; lively and witty in conversation; a good actor, and a dashing, fearless soldier. In intellect he is clear, acute, vigorous and discriminating, but not profound; subtle, ingenious and penetrating, but not so original or inventive; socially, he is friendly and loving, but often inconstant in his affections. As a writer, he is animated, facile, dramatic; rich in all the ornaments of style, in verbal niceties and in apt illustrations, but often verbose and tedious."

It is difficult to give a description of the Italians, as they are made up of different races. The love of artistic taste and beauty seem to be predominant features in their characters. The world's greatest artists, and some of its greatest poets, were sons of Italy.

The Spaniards are, says Jacques, "firm, self-reliant, proud, grave, courteous, affable, brave, devotional, passionate, secretive, politic, persistent, fanatical, cruel, revengeful, and relentless."

The Irish are impulsive, enthusiastic, ardent, quick-witted, kind-hearted, patriotic, natural orators, fond of jovial companions and ardent spirits, lacking in caution and forethought, and inclined to make ludicrous blunders.

The Scotch are close observers, philosophical, critical, accurate, shrewd in driving bargains, cautious, economical, persevering, inclined to stubbornness, fond of controversy, and religiously inclined.



COIN OF CALIGULA.

CHAPTER VII.

THE RELIGIONS AND SUPERSTITIONS OF MEN.

“Religion is always the expression of an idea. Man conceives the notion of a great cause; guided by his feelings, by the powers of selection, he conceives an ideal, and this ideal becomes to him an object of passionate devotion.”—*S. Baring Gould*.

Religion, in its broadest sense, may be defined as a feeling existing in man, of respect for, or fear of, a higher power than man himself. Among Christian people it is understood to mean the reverence for the Creator and Ruler of the Universe, and including all those acts or services of worship which such a feeling prompts. Reverence is made up of respect, or esteem, and fear.

Superstition, is a word often applied to the religion of savage and ignorant nations by Christian people, and men who profess not to believe in any religion often apply it to designate the beliefs and observances of the followers of the Christian religion. The word superstition means literally a “standing still over,” and figuratively, an amazement, wonder, or dread of something beyond the comprehension of the individual, or the feeling of fear or wonder caused by something mysterious and unaccountable. It is applied, also, to designate the belief in various supernatural powers, as ghosts, hobgoblins, fairies, witches, etc. As to the derivation of the word religion, there is a difference of opinion; some taking it from the Latin *religare*, “to bind back,” or “bind fast,” others from *religere*, “to gather,” or “collect again.” As will be seen, the origin

of the word does not throw much light upon its meaning as we understand it to-day.

The savage has no idea of the physical causes of phenomena which he may behold, and the only kind of agency he can conceive is that of mind or will like his own, hence he ascribes all actions and phenomena outside of those produced by himself or fellow-man to a superhuman being or beings endowed with qualities and attributes like his own, but much greater in degree. For these supernatural powers, the savage has either fear or respect, or he may have a mingling of both, constituting reverence. If these supernatural powers work him harm, he fears them; if good, he respects them; if both good and harm, or harm to his enemies, or if he finds out that he can do nothing to oppose or evade them, he will reverence them. By supplication, by gifts, or by self-torture, he will seek to appease their wrath or purchase their leniency, and this constitutes his worship.

The Namaquas shoot poisoned arrows at storms, which threaten to injure them; the Payaguan Indians rush at the winds with clenched fists and firebrands; the Esthoni-ans of Russia throw knives and stones at the whirlwinds of dust; the Calmucks fire guns at storms; the Zulus whistle at the lightning, just as they whistle to their cattle to drive them out of their pens. We read of savages, who, when there is an eclipse of the sun, assemble and beat drums, and make loud cries to frighten away the monster which they suppose is devouring that luminary; and we have numerous instances of tribes who offer sacrifices and supplications in the hope of averting storms, conflagrations, and other destructive powers of nature. (See Chapter I, Book I.)

In giving the characters which distinguish man from the lower animals, in a former chapter, I made mention of

the fact that man alone possesses a religious feeling. I can only repeat this fact here. Religion is one of the most distinctive and characteristic marks of man as a being in the animal scale. Here, if nowhere else, a line may be drawn between man and the brute.

The religions of men are usually classified as follows : (1) *Monotheistic* ; or, those which involve a belief in one God or supreme Creator and Ruler. (2) *Polytheistic* ; or those whose followers believe in many gods. The former class is divided into the *Christian*, the *Jewish*, and *Mohammedan*. The followers of polytheistic religions are frequently called *Pagans* or Heathen. The above classification does not include the religions which have become extinct, as the religions of ancient Greece and Rome, of the Egyptians, the Norsemen, and ancient Mexicans and Peruvians. These are, however, usually treated under the head of mythology. I shall devote a portion of the next chapter to their consideration.

The doctrines or teachings of Christianity, which are generally subscribed to, may be stated as follows : (1) *The existence of one God*, who is the Creator and Supreme Ruler of the universe, who is omnipotent (all powerful), omnipresent (everywhere present), and omniscient (all-seeing). (2) *The Fall of Man*. The human race was involved in misery by transgression, and every individual is thereby unfit for the service and fellowship of God. (3) *The Atonement*, or reconciliation with God by the death of Jesus Christ, the Son of God. Man is incapable of delivering himself from sin and misery, but by repentance is delivered through the death and suffering of Jesus Christ.

These may be considered as fundamental doctrines subscribed to by the majority of sects and individuals professing the name of Christians. There are, however,

some who differ radically in regard to the fall of man and the atonement. As to modes of worship, church government, and minor points of belief, the Christian world is divided into a vast number of sects or schools, but all may be grouped under three principal divisions: (1) *Roman Catholics*; (2) *Protestants*; (3) *Greek Church*.

THE ROMAN CATHOLICS.

The word Catholic means simply universal, or general, and was assumed by the early Christians to distinguish themselves from sects which held different beliefs, but sometimes took the name of Christians. The Romish or Papal church now uses the name Catholic to distinguish themselves from those who have separated from them. They say theirs is the only true church, and all who do not follow their teachings are heretics.

The word Pope comes from the Greek, and signifies "father," and has for many hundred years been applied to the Bishop of Rome. The word Bishop is also of Greek origin and signifies an overseer, or superintendent, and was early applied to chief officers in the church. The terms *apostle*, *presbyter*, *elder*, *priest*, and *bishop* in the early history of the Christian church, all had a similar significance, that of over-seer, ruler, or one having authority. The seat of power, or the territory over which the bishop had control, was called a *see*; thus, we often hear the expression "the see of Rome."

The origin of the Roman Catholic church dates back to a very remote period. In order to get a clear idea of its origin and claims to superiority, we must notice briefly the history of the early Christians or followers of Christ.

The word church is from Anglo-Saxon, and like the Scotch *kirk* and the German *kirche* was originally derived from the Greek, and signifies "belonging to the Lord,"

and means, as we understand it to-day, the entire body of those who profess to be believers in the doctrines of Christ. At first Christ chose twelve disciples, or followers, whom he afterward made apostles, the word apostle meaning "one sent." This may be considered as the first organization of the church. The meeting on the day of Pentecost, as described in the second chapter of Acts, and which occurred A. D. 30, is however, considered by some as the birthday of the Christian church. In accordance with the command, to "go into all the world and preach the gospel

to every creature," the apostles and followers of Christ spread themselves through various parts of Asia and Europe, and in process of time their doctrines gained ground and the number of their followers greatly increased.

It must be remembered that about the time of Christ's appearance, the greater part of the world,

then known to the most civilized people, was under the government of the Roman empire, which had its capital at Rome, in Italy. The doctrines of the followers of Jesus were despised by the Romans, and the apostles, with their adherents, were persecuted wherever they went. Nero, known in history as one of the most cruel monsters the world has ever seen, was one of the most active emperors of Rome, in persecuting the Christians. He caused them to be sewn up in skins, to be torn or killed by dogs, and to be covered with pitch, then lighted as torches for the amusement of the people.



FIG. 129.—REPUTED TO BE PAUL THE APOSTLE,
MEDAL OF HERCULANEUM(?).

In spite of persecution the followers of Christianity increased in number and influence until in time they began to be recognized by high authority and in 324 A. D., Constantine the Great, an Emperor of Rome, made Christianity the religion of the State.

From a very early period the church had a form of government, and among those having the highest authority were the bishops. When Christianity was made the national religion, the bishops in various large cities of the empire acquired considerable power and became about



FIG. 130.—OTHO THE GREAT (EMPEROR OF GERMANY, 936-973).

the same as princes, or rulers, over the territories in which their cities were located. Many of those in the western parts of the Roman empire assumed the title of Pope, and among the number was the Bishop of Rome. This city being the capital of the Roman empire and most important city of the world, it is not strange that its highest authority in church matters, the Bishop or Pope, should gradually assume the leadership of the church in general.

The times were troublous and often the Pope became a *protector*.

The Christians of the eastern part of the Roman empire opposed the assumption of power in spiritual affairs which was assumed by the Pope of Rome, and the result was a separation of the church into two great divisions, the Greek or Eastern Catholics, and the Roman or Western Catholics.

The first recognition of the Pope as a *temporal* ruler

was by Charlemagne who was crowned emperor of the West by the Pope, on Christmas day, 800. One of his successors, Otho the Great, Emperor of Germany, (936-973), confirmed the Pope's grant of Italian territory.

About the close of the eighth century the Pope of Rome began to acquire power in political as well as spiritual matters and from this on for two hundred years the Papal power increased until in the tenth century, it was opposed by the Emperor of Germany, but the subjects of the latter refused to sustain him against the Pope, whom they considered to be God's agent on earth.

Under Pope Gregory VII. (1073-1085) the papacy reached the zenith of its power. The Emperors of Germany had always claimed the right of appointing bishops. Gregory struck a deadly blow at this custom, and an open rupture ensued between him and the Emperor Henry IV. Henry was obliged to undertake a penitential journey to Canossa, Italy, where he stood for three days



FIG. 132.—POPE GREGORY VII.

and nights in midwinter, clad in a shirt, before the palace in which the Pope was stopping. Gregory triumphed, but afterward he was obliged to go into exile, where he died.

For several hundred years more, or until the sixteenth century the Papal power held almost absolute sway, all Europe, except Turkey and Russia, being under the spiritual and largely the political government of the Pope at Rome. Then began what is known as "The Reformation," and the rise of the Protestant church, since which time the Roman Catholic church has continued to de-

cline in political power. So intimately connected has this division of the Christian Church been with governmental affairs, that, it may be said, the history of Europe for eight hundred years has been the history of the Roman Catholic church.

The Roman Catholics believe that Jesus Christ ordained Peter as the chief apostle or bishop, next to himself, to watch over his people here on earth and preserve their unity, and to this end gave him the necessary power. The successors of Peter are endowed with like charge and power for all time to come. The foundation for this belief

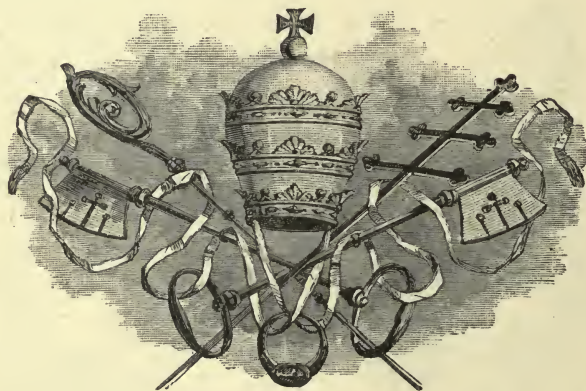


FIG. 133.—PAPAL INSIGNIA.

rests mainly upon the following words of Christ to Peter :
"Blessed art thou, Simon Bar-jona ; for flesh and blood hath not revealed it unto thee, but my Father which is in heaven. And I say also unto thee, that thou art Peter, and upon this rock I will build my church ; and the gates of hell shall not prevail against it. And I will give unto thee the keys of the kingdom of heaven ; and whatsoever thou shalt bind on earth shall *be* bound in heaven"—
Matt., 16.

They believe St. Peter to have been the first Bishop of Rome. There is no evidence of this in the Scriptures,

but there is a tradition to that effect, which was generally believed until the sixteenth century. Including St. Peter, there have been 264 popes, who have successively stood at the head of the Roman Catholic church. The present pope is Leo XIII., who succeeded Pius IX. in 1878. Protestants, generally, deny that St. Peter was ever a bishop at Rome, although they admit that he may have suffered martyrdom there. They also call in question many of the names and dates of the first part of the list of popes as given by the Roman Catholics. The popes were formerly elected by the clergy and the people. Sometimes these elections were attended with violence and bloodshed. By a decree of Pope Nicholas II., in 1059, the cardinals were given the power of electing the pope. The cardinals are officers of the church, next in rank to the pope. Long usage requires that the candidate be an Italian, and of mature age, and a two-thirds vote is required to elect. The election is conducted with all the precautions attached to a jury in a great criminal case.

DOCTRINES OF THE CATHOLIC CHURCH.

The chief doctrines of the Romish church are as follows: They believe in the *Trinity*, that is, that there are three persons in the God-head, the Father, Son, and Holy Ghost, and that these three are one, true, eternal God, the same in substance, equal in power and glory; and in the *incarnation* of Christ through the mysterious operation of the Holy Ghost in the person of the Virgin Mary; and that he suffered death by crucifixion, for the sins of mankind. They entertain a high degree of veneration for the Virgin Mary, whom they style "the mother of God," because her Son, Jesus Christ, was God in human form. They ascribe to her all possible perfection and freedom

from sin, and render her worship in an inferior degree on account of her exalted position. They believe in *atonement*, or the doctrine that Christ's blood was shed for the redemption of all mankind; but that man can not be saved by anything he himself may do,—he must repent of his sins, and be humiliated. Baptism is held as a remedy for original sin, and applicable to infants as well as adults. Worship in the form of prayer and sacrifice is due to God only; but inferior honor is given to the Virgin Mary, and the angels, also to the saints and martyrs, or those who have rendered themselves worthy, and are now crowned with glory in God's kingdom. Prayers are made to the saints, but only as appeals to them to intercede with God for the people. They pay respect to the crucifix, and to pictures and images of the saints and the Virgin Mary, also to relics or objects used by the saints, because, as they say, all these things lead their mind back to God, and away from worldly objects. They believe in the doctrine of *infallibility*, "which attributes to that church as the divinely-appointed teacher of mankind, and to the Roman pontiff (the pope), as pastor of the whole church, the privilege of being preserved from error." They base this doctrine chiefly on the following Scripture: "Go ye therefore, and teach all nations, baptizing them in the name of the Father, and of the Son, and of the Holy Ghost; teaching them to observe all things whatsoever I have commanded you: and lo, I am with you always, unto the end of the world."—*Matt.*, 28. They believe in the existence of *Purgatory*, or a place of temporary suffering in the next world. According to their teaching, every sin deserves and will receive punishment, either before or after death, and while repentance and forgiveness wash away the guilt of sin and remove the eternal punishment, it does not remove the temporary penalty, which must

satisfy God's justice. They believe that the sufferings of souls in this middle state may be mitigated by the prayers of their friends on earth, and one day in the year—All Souls Day (Nov. 2)—is set apart for prayers of that nature.

The entire clergy of the church, from the pope down, are required to practice *celibacy*, that is, they are forbidden to marry. Their worship consists of many forms and ceremonies too complex to be described here. The only version of the Bible they recognize is the Vulgate, a very ancient Latin translation. Their liturgy or established form of verbal worship, is in Latin; but doctrines are often expounded by the clergy in the language of the people.

SAINTS' DAYS AND FASTING.

Besides Sunday or the Lord's Day, they set apart many other days for special observance. Some are in honor of the Virgin Mary, some of various apostles, martyrs, and saints of every class. *Fasting* is a part of their worship and discipline. The fast days usually observed are: Lent, or the forty days before Easter; Ember Days, which are a Wednesday, Friday, and Saturday of each of the four seasons; Christmas and Pentecost; Assumption (Aug. 15), the day honoring the ascent of the Virgin Mary to heaven; All Saints' Day (Nov. 1). Flesh meat is abstained from on each Friday of the year, and in some countries on Saturday.

THE JESUITS.

The Jesuits, or "Society of Jesus," is the name of a secret order of the Roman Catholic church. It was founded by Ignatius Loyola, and approved in 1540. It is a very large and influential society consisting of priests

and scholars, the former of whom can not leave or be dismissed from the order, but the latter may. It is through this society that the church carries on her chief missionary and educational work. They have displayed an unbounded degree of zeal and enthusiasm in promoting their work, having carried the gospel into every land and nation in advance of civilization, of which they were in most cases the pioneers. The early history of our own country, as well as South America and Mexico, is largely made up of the doings of the Jesuit missionaries. Their opponents, however, accuse them of using artifice and intrigue in accomplishing their ends, so that the words Jesuit and Jesuitical have become to many, exceedingly odious terms.

Says Draper in his "Intellectual Development of Europe," "There was no guise in which the Jesuit might not be found—a barefoot beggar clothed in rags; a learned Professor lecturing gratuitously to scientific audiences; a man of the world living in profusion and princely extravagance; there have been Jesuits, the wearers of crowns. There were no places in which they did not find their way; a visitor to one of the loyal old families of England could never be sure that there was not a Jesuit hidden in the garret or secreted behind the wainscot of the bedroom. They were the advisers of the leading men of the age, sat in the cabinets of kings, and were their confessors. They boasted that they were the link between religious opinion and literature. With implicit and unquestioning obedience to his superior, like a good soldier, it was the paramount duty of the Jesuit to obey his orders, whatever those orders might be. It was for him to go, at the summons of a moment, with his life in his hand, to the very center of pagan, or of reformed or revolted countries, where his presence was death by law, and exe-

cute the mission intrusted to him. If he succeeded, it was well. To him all things were proper for the sake of the church. It was his business to consider how the affair he had in hand was to be most surely accomplished—to resort to justifiable means if they should appear sufficient, if not, to unjustifiable; to the spiritual weapon, but also to be prepared with the carnal; to sacrifice candor if the occasion should require, if necessary, even truth, remembering that the end justifies the means, if that end is the good of the church.”

Buckle designated the Jesuits as “the obstinate enemy of progress and of toleration,” an assertion too broad, as the pioneer work done by the missionaries certainly did much to advance civilization. They were at one time banished from France, Spain, Portugal, and other Catholic countries, and the Order was abolished by the pope in 1773, but was afterward restored. The Pope, Clement XIV., who signed the “bull” for the suppression of the Jesuits, was poisoned, and died a lingering and terrible death. The poison was administered by Jesuit agents.

Under the names of Brothers of Charity and Sisters of Charity, there are in the Roman Catholic Church two beneficent societies, the objects of whose members are to devote their lives to nursing the sick in hospitals and elsewhere, and to administering to the poor and destitute, without distinction of faith, nationality, or rank. These societies have done, and are doing an immense amount of good. The Sisters of Charity in 1862 numbered as many as 28,000 members, scattered in all parts of the world.

NUMBERS OF THE ROMAN CATHOLIC CHURCH.

The number belonging to the Roman Catholic Church is estimated at about 200,000,000. In 1882 there were 6,880,000 Catholics in the United States, the greater

number being Irish and German immigrants and their descendants. It is the religion recognized by the state in Italy, Spain, Portugal and France, and is the prevailing one in Mexico and South American States.

The principal church edifice of a diocese (the territory controlled by a bishop), and containing a bishop's throne, or seat, is called a cathedral. Many of the most magnificent structures in the world are Roman Catholic cathedrals. Some of them were commenced many centuries ago, and are not yet completed. The genius and skill of

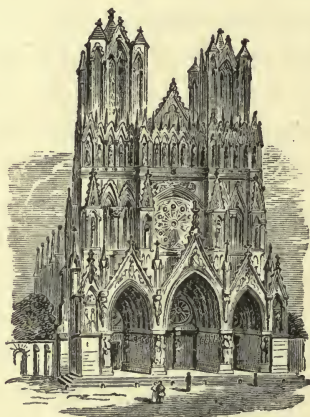


FIG. 134.—CATHEDRAL OF RHEIMS (WHERE THE FRENCH KINGS WERE CROWNED).

some of the greatest artists of the world have been expended in their construction and decoration.

The Church of St. John of Lateran at Rome, founded by Constantine the Great, is the cathedral of the Pope, and has this inscription, "Mother and head of all the churches of the city and the world." No one but the Pope can officiate at its chief altar. This altar covers an ancient altar at which, it is said, St. Peter himself once officiated. The Church of St. Peter's at Rome is the most magnificent in size and splendor, and of the greatest

antiquity of any of the cathedrals. It is said that in the year 90, Anacletus, Bishop of Rome, erected an oratory on the spot where St. Peter was buried, and in 306 Constantine built a church upon the same spot. In 1450 another building was commenced on the same site; this was continued from time to time, for 350 years. The great sculptor and painter, Michael Angelo, expended much of his talent upon it. The top of the dome is 448 feet from the pavement. The cathedral at Milan is also celebrated. It is perhaps the most beautiful building in the world. The exterior is of white marble, and contains niches and pinnacles for 4,500 statues, over 3,400 of which are completed.

THE VATICAN.

The Pope resides in the palace of the Vatican, a building containing 4,422 rooms. For several years after the occupation of Rome in 1870 by the Italian army, he chose to remain a voluntary prisoner. The Vatican contains one of the finest and largest museums in the world. Many of the works of art of the great masters, as Michael Angelo and Raphael, are to be found here. It contains a library of over 100,000 volumes, and most valuable collection of ancient manuscripts in the world. I have devoted a proportionally large space to a consideration of the Roman Catholic Church, because of its antiquity, its interesting history, and its relation to art, science, and general progress. Although many things connected with its past history, and much of its present teaching is strongly condemned by Protestants and others, it must be admitted that much good has been done by it in the past, and that to-day its work in the line of charitable duties deserves commendation, and that there are many honest and sincere people who hold to its teachings.

THE PROTESTANTS.

As before stated, up to the sixteenth century, the Roman Catholic Church held almost absolute sway, politically and spiritually in Western Europe. There were, however, here and there small sects whose members did not believe in the claims of the Pope of Rome, and preached against the doctrine of the Romish Church. Among these were the *Albigenses*, a sect which arose in the south of France in the twelfth century. Wycliffe in England, preached similar doctrines, and in the fifteenth century, Huss in Bohemia. Most of these dissenting churches were suppressed, and many were burned as heretics. But the flames broke out afresh in the beginning of the sixteenth century, and dissent became general over many portions of Europe. The complaint against the corruption of the church increased, and many began to think that the doctrines believed by the church were to a great extent contrary to the teachings of the Bible.

SALE OF INDULGENCES.

This growing feeling of dislike was not without foundation. The church had become in many of its practices very corrupt. The church had for a long time believed and practiced the granting of *indulgences*. These were remissions of the punishments for sins, granted by the church, for, according to their doctrine, all of the good works of the saints which were in excess of those necessary to their own justification were deposited, together with the merits of Jesus Christ in a great treasury, which was inexhaustible, and that these treasures were committed to St. Peter and his successors, the popes, and that the latter as representatives of the church could at pleasure grant a portion of this saving merit to any person for a sum of money. Pope Urban was the first who granted

these indulgences. He gave them to those who fought in the Crusades or Holy Wars, for the recovery of Palestine from the Turks. This power was greatly abused. Pope

Léo X., to raise funds to carry on the building of St. Peter's Church, offered remission of the sins of any one who would contribute money for that purpose. To carry out this project more fully, he granted to the Archbishop of Magdeburg the power of the sale of indulgences in Saxony, and in other countries he let them out to the highest bidders. The persons who thus obtained the power to remit sins, sent out preachers to advertise these licenses, "If



FIG. 135.—CRUSADING KNIGHT.

any man," said they, "purchase letters of indulgence, his soul may rest secure with respect to its salvation."

THE REFORMATION.

This abuse of indulgences was the provoking cause of the movement known as the *Reformation*. The men who had the right to sell indulgences in Germany employed as their agent a man named Tetzel. This man sold indulgences in the streets, advertising his letters by the sound of trumpets and beating of drums. There were not a few who opposed these corrupt practices, and foremost among them in Germany was *Martin Luther*, a professor of theology in the University at Wittenburg. Luther was a remarkable man, and his history in connection with this great reform movement is exceedingly interesting. A characteristic utterance of his was the following, referring to Tetzel: "God willing, I will beat a

hole in his drum." He posted upon the door of the church in Wittenburg, his famous ninety-five theses, or denunciations of the sale of indulgences. Great excitement followed, and Luther soon had his adherents throughout Germany and other countries of Europe. The pope was indignant, and issued a bull of excommunication against Luther, but the latter defied his power, and publicly burned the order before the gates of Wittenburg. The pope appealed to Charles V, Emperor of Germany, the most powerful monarch of the time, for aid in crushing the reformers. This monarch summoned the princes of the German Empire to meet at a city called Worms, and commanded Luther to appear before this council, or Diet, and retract his belief.



FIG. 136.—MARTIN LUTHER.

Luther boldly came to Worms, but refused to make concession. Said he, "I am resolved to enter Worms, although so many devils should set at me as there are tiles on the housetops."

Later the Diet of Spires renewed the attack upon Luther and his followers. They issued a decree forbidding any change until a general council could be held. Luther and a number of princes and others *protested* against this decree, and from this on, the reformers were called *Protestants*. The religious wars which resulted as a consequence of the Reformation lasted thirty years and completely exhausted Germany, but the reformed religion was finally established in most of the states.

DOCTRINES OF THE PROTESTANTS.

The principal doctrines of the Protestants, when they first separated from the see of Rome were : (1) That the Bible was the supreme authority for the church, and above that of decrees of councils and bishops. (2) That the Bible should be interpreted by its own language and connection, and independent of tradition outside of itself or custom. (3) That the Bible should be free to all, and divine service should be in the language of the people, and not in Latin. (4) That celibacy was not binding upon the clergy, and that monastic orders should be abolished.

PROTESTANT SECTS.

The name Protestant to-day is applied to all Christians who are not members of the Roman Catholic, or Greek Churches. They are divided into numerous sects, or denominations, many having widely-varying views, both in doctrine and mode of church government, while others differ but slightly in these respects. A strict classification would be scarcely possible.

They are sometimes divided as to their belief in the doctrine of the Trinity into two great classes, *Trinitarians* and *Unitarians*. The doctrine of the Trinity has been explained in the preceding pages. It is held by the majority of the denominations of Protestants as well as by the Roman Catholics. The Unitarians deny that Christ is equal with God, and generally reject the idea of total depravity, and the necessity of a vicarious atonement. There are, however, many modifications of these beliefs, and the denomination known as Unitarians to-day, allow the greatest freedom of individual belief on these questions. The doctrine of the inequality of Christ is held by most of the denomination known as Universalists,

although they generally believe in the vicarious atonement. These questions have been the subjects of much controversy, both in earlier and later periods of the history of the church. In 1553 Michael Servetus was burned at the stake at Geneva for his disbelief in the Trinity. The Unitarians and Universalists are often called Liberal Christians, in contradistinction to Orthodox, a term applied to the majority of the other denominations of Protestants. Protestantism is the prevailing religion in all countries of the Teutonic race, except in portions of Austria. It is predominant in Germany, Great Britain, Holland, Denmark, Sweden, Norway, Switzerland, the United States, and in most of the colonies of these nations. The total number of adherents is estimated at 110,000,000, of which 33,000,000 are found in America.

THE GREEK CHURCH.

This division of the Christian Church calls itself the "Holy Orthodox Catholic and Apostolic Church." Its origin dates back to the downfall of the Roman Empire. When the latter was divided into the Eastern and Western Empires, the Christians of the Eastern division refused to allow the claims of the Bishop of Rome. The head of the Greek Church was the Patriarch of Constantinople. This city being the capital of the Eastern Empire, the bishop of this see would naturally become the leader of the church in that division. But in 1588 Russia became partially separated by receiving an independent patriarch, and in 1850, Greece, in a similar manner became separated, and to-day the church exists in three distinct branches, the church of the Ottoman, or Turkish Empire, with the patriarch of Constantinople at its head, the Russian Church, and the church in Greece, each with its own patriarch. After the Reformation there was an

attempt made by the Protestants to establish an understanding with the Greek Church. This resulted only in further separation, as it called forth a declaration of doctrine, or the establishment of a creed, which was signed by the patriarchs and bishops, thus drawing the line plainly between the Greek Church and the Reformers. The doctrines and worship of the Greek Church differ in some respects from the Roman Catholics, yet in many other respects are similar. They believe in the *infallibility* of ecumenical councils (councils representing the whole body of the church), but deny the authority of the Pope. They deny the existence of a *purgatory*, but pray for the dead, that God will be merciful to them in the day of judgment. They approve of the marriage of the priests, provided they enter into that relation before admission to the priesthood. They condemn second marriages of priests, and fourth marriages among the people. They admit no images, but use paintings and engravings as aids to worship. The Greek Church predominates in Russia, Turkey in Europe, Greece and Montenegro, with a few followers in Austria, Germany, and some in other countries. The total number of adherents to this faith is estimated at 78,000,000. Besides the Greek Church proper there is the United Greek Church, which includes those who, while following the modes of worship and discipline of the Greek Church, are united to the Church of Rome, and admit the supremacy of the Pope. They are found principally in Italy, Austria, and Poland, and number nearly 5,000,000.

THE JEWISH RELIGION.

The history of the Jewish religion is really the history of a nation and of a literature. It is also the history of Christianity for thousands of years. Although we or-

dinarily date the beginning of Christianity from the birth of Christ, yet in reality it should begin with Abraham, the parent of the Jewish, or Hebrew race, and the founder of the Jewish religion. The distinguishing characteristic of the Hebrews as a race was their belief in, and worship of, one God. All other nations of the same great family (the Semitic), as the Assyrians, Babylonians, Phœnicians, and Carthagenians, while they believed in a supreme deity, paid homage to a multitude of inferior gods. Sometimes one god was promoted to the first place and sometimes another, and their religion was a representation of a spirit within and behind natural objects and forces. But with the children of Abraham it was different. They believed in one true, eternal, omnipotent God, and held that all images and representations of God, or of supernatural forces, were sinful. This idea is well expressed by Strabo, a Greek geographer, who wrote about the beginning of the Christian era. He said, "Moses taught that the Egyptians were not right in likening the nature of God to beasts and cattle, nor yet the Africans or the Greeks, in fashioning their gods in the form of men." He held that this only was God,—that which encompasses all of us, earth and sea, that which we call heaven, the order of the world, and the nature of things. Of this, who that had any sense would venture to invent an image like to anything which exists among ourselves? "Far better to abandon all staturary and sculpture, all setting apart of sacred precincts and shrines, and to pay reverence without any image whatever." This pure monotheism is expressed in numerous passages of the Old Testament. "Hear! O Israel, the Lord our God is one Lord!" "Thou shalt have no other gods before me." "Ye shall not go after other gods." "For the Lord your God is God of gods, and Lord of lords." "Ye shall

make no mention of the name of other gods." This belief was an organized one first among the descendants of Abraham. The religion of the Hebrews, or Jews, before the time of Christ, is given in the Old Testament, and is, or should be, familiar to all. The worship of the Jewish people to-day differs very little from the worship in the synagogues in the time of Christ. The characteristic distinction between the belief of the Jews and the Christians is that the former reject Christ as the promised Messiah, and look forward for a Messiah to come. Consequently they reject the New Testament Scriptures. They follow in the main the teachings of Moses as laid down in the Old Testament and the laws and doctrines of the Talmud, or book of ancient Jewish laws and doctrines.

FORMS OF WORSHIP.

A synagogue is a Jewish house of worship or place of assembly, and the word has a use also, corresponding to the word church, and means the Jewish community in general. It seems that they were established at a very early period in all the towns for the benefit of those who could not take part as often as three times a year in the worship of the temple at Jerusalem. The people met on Sabbaths and feast days in the synagogues for common prayer and religious instruction.

A peculiarity of the synagogues was that they were always constructed so that the worshipers faced in the direction of the city of Jerusalem. All eating and drinking or reckoning accounts were considered profane, and strictly prohibited in the synagogues. The buildings were miniature representations of the form of the temple at Jerusalem, and at the extreme eastern end was the holy ark, containing several copies of the Pentateuch (the five books of Moses), and in front of this was a stand for the

public reader of prayers, and in the center of the room was a platform for the preacher, or expounder of the Scriptures. The women sat apart from the men in a kind of gallery or raised platform. The synagogues of to-day are constructed in a manner very similar to those in ancient times. Sermons, or lectures, are often delivered



FIG. 137.—A JEWISH BOOK.

from the stand in the center by the Rabbi, or officiating minister, or by a special lecturer. The men keep their hats on during the service. The Jews are scattered throughout the nations of the world, and are in a certain sense, a distinct people, having their own peculiar customs derived from the laws of Moses and the Talmud. They are, in civilized countries, generally a thrifty, prosperous people, mostly engaged in mercantile pursuits, and many of them are extremely wealthy. The number of the Jews in the world is variously estimated at from 3,500,000 to 15,000,000. Upon the first estimate, Europe is said to contain 2,500,000, of which 1,700,000 belong to Russia ; Asia 130,000 ; Africa 504,000 ; America 30,000.

PERSECUTIONS OF JEWS.

They have been at various periods, and in almost every country subject to persecutions, some of which were severe in the extreme. They have been beaten and tortured, banished from the countries in which they had settled, and in some cases burned alive by the thousand. Over 300,000 of them were in 1492 driven out of Spain, and in France, in 1321, 160 of both sexes were burned together in one pile. Nor were these persecutions confined to the dark ages of the world. Quite recent times have

seen these outrages committed by one race upon another. The following summary from a speech by the Hon. Wm. M. Evarts, describes the recent persecution of the Jews in Russia: "Men have been murdered, women outraged, children dashed to pieces, or burned alive; whole streets occupied by Hebrews razed to the ground and desolated by fire; thousands of families reduced to beggary, and many banished from their homes. One hundred and sixty towns feel this scourge of persecution." In Persia the Jews are treated with the greatest contempt by the Mohammedans. They are obliged to live in a part of the city by themselves, and are allowed to sell only spices, drugs and jewelry. They are regarded as unclean, and not allowed to go out when it rains for fear some dirt might be washed off of them, and contaminate the feet of a Mohammedan. Should a Jew enter a shop to purchase anything, he dare not touch the goods, for if he does, he must pay whatever price the shopkeeper may ask. Their houses are often entered by Mohammedans, and their property carried off, and if the Jew attempts to defend it, he runs the risk of his life. These are only a few of the indignities a Jew must suffer in this country. Where they are not actually persecuted, they are generally despised by the people among whom their lot is cast. There may be some grounds for this, but in most cases it is evident that it is merely race prejudice, and the result of a misunderstanding of the motives and actions of this peculiar people. Perhaps envy and jealousy have much to do with it. As an illustration of the popular opinion held in regard to the Jews, the following from a noted Christian minister may be quoted: "Dispersed as they are, they are still a distinct people, a nation within other nations. Like drops of oil floating on the water, but never mingling with it, so the Jews are found everywhere,

floating drops of national life in the midst of other nationalities."

As a reply to this, I may quote an article written by a Jewish lady in reply to an article from a Russian standpoint upon the recent persecutions of the Jews in Russia. She says, "That the Jews should ever form a hostile 'state within a state,' is rendered impossible by a solemn Biblical injunction, commanding fidelity to the ruling government; 'and seek the welfare of the city whither I have banished you, and pray in its behalf unto the Lord, for in its welfare shall ye fare well.' There is no such thing, therefore, as an independent, disloyal Jewish community, in Russia or out of Russia."

There are of late years, many Jews who have adopted Christianity, and are known as "Reformed Jews." Some eminent characters in the various fields of genius have been of the Jewish race. Of these may be mentioned, Spinoza, the eminent Dutch philosopher, (b. 1632); Heine, the German poet and wit, (b. 1800); Rachel, the famous French actress, (b. 1820); Mendelssohn-Bartholdy, the great German musical composer, (b. 1809); and Benjamin Disraeli, Earl of Beaconsfield, the famous English statesman and author, (b. 1805).

MOHAMMEDANISM.

This is the name given by Christians to the religion established by Mahomet, or Mohammed. The adherents of this faith call themselves *Moslems*, which means "people of the Islam," and their religion *Islam*, which signifies "submission to God."

Mahomet was born about the year 570 A. D., in Mecca, in Arabia. He was the son of a poor merchant, and was left an orphan at a very early age. When a child, and also during his adult life, he had frequent epileptic

fits which were attributed to the fact of his being possessed by devils. At the age of twenty-five he married a wealthy widow, aged forty, and gave up his business, which was that of a merchant, to take care of her property. From his twenty-fifth to his fortieth year, he was accustomed to spend much of his time in a cave engaged in solemn meditation, and it was there in his fortieth year, that he had his first vision. He claimed that the angel Gabriel appeared to him, and commanded him to write down what the Lord should reveal to him, and to spread it abroad among the people. It is said that at first Ma-

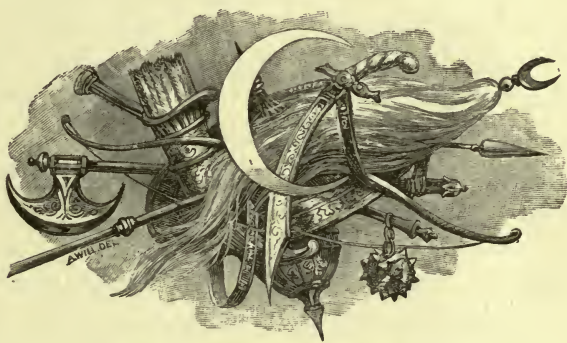


FIG. 137.—MOHAMMEDAN EMBLEMS.

homet was troubled, not knowing whether it was a good or bad spirit that advised him, and that he consulted his wife, who in turn consulted her cousin, a blind old man, who told her that Mahomet was destined as the chosen prophet of God. After this he received numerous revelations which he dictated to secretaries who committed them to memory, and after Mahomet's death they were written down.

His doctrines met with opposition from the first. His wife was his first convert. In a few years, however, he had gained quite a number of followers, but they were

persecuted, and with them the prophet was obliged to flee from his native city to Medina. This flight is called by the Mohammedans, the "Hegira," and from this they begin to number the years in their calendar as the Christians date from the birth of Christ. The Hegira is supposed to have taken place in the year 622 A. D.

THE SWORD OF ISLAM.

The prophet now took up arms in defense of his faith. He soon drew around him a crowd of adventurers, and his army was victorious in many battles, and in ten years the whole of Arabia had acknowledged his sovereignty. He next prepared to carry his religion by the sword into other countries, but his life was brought to a close by an attack of fever in the year 632. In the early part of his career, Mahomet was a kind-hearted and amiable man, but after the Hegira, when he began to force his religion at the point of the sword, he became cruel and vindictive. At one time he ordered the execution of over seven hundred Jewish prisoners, and sold their wives and children as slaves. His wife having died, he began to practice polygamy, and in a short time had married ten wives. Of his character, Rev. James Freeman Clarke says, "He was a great man, one of the greatest ever sent upon earth. He was a man of the deepest convictions, and for many years of the purest purposes, and was only drawn down at last by using low means for a good end."

The rapid spread of Mohammedanism is a marvel and a mystery. In the space of one hundred years, the Arabs, who before consisted of eighty-three different petty tribes at war with each other, conquered Syria, Persia, Spain, and the whole of Northern Africa, and carried with them this new form of monotheistic religion. In that time they conquered as much territory as the Romans did

in seven hundred years. They bore the *crescent* into the very heart of Christendom and carried dismay to the followers of the cross.

THE MOSLEM CREED.

The essential feature of Mohammedanism is expressed in the following oft-repeated sentence: "There is no God but God, and Mahomet is the prophet of God." This is the only doctrine necessary to subscribe to in order to become a Moslem. Their idea of God differs but little from the Christian's, save that they do not accept the doctrine of the Trinity. They hold that there were six great prophets sent into the world at various times to proclaim new laws and new dispensations. These prophets were Adam, Noah, Abraham, Moses, Jesus, and last and greatest of all, Mahomet. They claim that to the prophets were revealed certain inspired Scriptures, of which all have perished except four, the Pentateuch, the Psalms, the Gospel and the Koran ("reading," sometimes written Alkoran and Alcoran, *al* being equivalent to *the*). The first three they say are in a mutilated and falsified condition. The last is their rule of faith and morals, and contains the revelations made to Mahomet and his teachings in regard to religion and religious duties.

They hold the Koran in great reverence. They will never allow it to be held below the waist nor touch it without first going through the ceremony of purification. They bind it in expensive style, the copies for the rich being sometimes printed in gold, and the covers made of gold, set with precious stones. To see a copy of the book in the hands of an unbeliever is exceedingly hateful in their eyes.

They deny that Jesus was the son of God, but admit that his birth was miraculous. They say he was not crucified, that he was taken up to heaven and some other

man was crucified in his place. Their reverence for Jesus is second only to their reverence for Mahomet. They believe that Jesus will come again upon earth to destroy anti-Christ, and that his coming will be a sign of the approaching day of judgment. They believe in the existence of angels who are employed in praising God, keeping a record of the actions of men, and interceding for mankind.

The Mohammedan's idea of heaven is that of a place of sensual pleasure. Byron describes the Mohammedan's Paradise in the couplet :

"The Persian's heaven is easily made,
'Tis but black eyes and lemonade."

The torments of hell are principally great extremes of heat and cold. They hold that after the judgment all will be obliged to walk over a bridge finer than the finest hair, sharper than a sword, and hedged on both sides with thorns, and that while the good will pass over into heaven safely, the wicked will tumble headlong into hell. All who believe in the *unity* of God will finally be redeemed from hell and enter heaven, but disbelievers, hypocrites and idolators will suffer eternally.

Hell is divided into seven apartments or stories, one below the other, which are assigned respectively to Mohammedans, Jews, Christians, Sabians (those who worshiped the heavenly bodies), Magians (priests of the religion of Zoroaster), Idolators, and last and lowest of all, to the hypocrites of all religions.

Christians are called by Mohammedans, infidels, unbelievers, and dogs. If a man disbelieves in Islam after being three times warned, he suffers death.

FORMS OF WORSHIP.

Their worship consists in (1) prayer accompanied by ablutions, (2) alms giving, (3) fasting, and (4) pilgrim-

ages to Mecca. They pray five times a day, and turn their faces toward Mecca. Their houses of worship are called mosques. On Friday the Mohammedan Sabbath prayers must be said in the mosques, on other days, they may be said in any clean place. Cleanliness is a religious duty.

All Moslems must once in their lives, provided they are able, perform a pilgrimage to Mecca, but this duty may be performed by a substitute.

The Koran forbids : Eating of swine's flesh, of blood, or of the flesh of any animal which dies of itself ; games of chance ; drinking of intoxicating liquors ; taking interest upon money.

All the Semitic nations practiced polygamy up to the time of Mahomet. The prophet while justifying himself for having ten wives on the ground that he had special permission from God, limited the number which a believer should have, to four.

THE SARACENS.

Saracen, a word of doubtful origin, is a term which was applied to Mohammedan Arabs who extended their conquering arms over a large portion of Asia, Europe and Africa, after the death of Mahomet. They were held in check by the Greeks at Constantinople. Their power was broken in a few years by the Christian nations, and they lost to a great degree their foothold in Europe.

In Spain, however, they established a kingdom which lasted seven hundred years. The successors of Mahomet were called *caliphs*. They were great temporal and spiritual rulers, and encouraged the cultivation of the sciences, arts, and literature. But soon the empire the Saracens founded was divided, owing to dissensions regarding the successor to the caliphate. There were three

caliphs, one at Bagdad in Asia, one at Cordova in Spain, and one in Africa. Bagdad was a magnificent and populous city. The most noted caliph of Bagdad was Haroun al Raschid, (Aaron the Just). It was during his reign that the famous stories known as the *Arabian Nights* were written. In them are depicted life and character in this famous city of Western Asia, and of the Moslems in general. No one knows who is the author of these famous stories. All we know is that they were first written in Arabic, and translated into the French by Antony Gallaud, and published first in 1704.

Every one should read these charming stories. "Here are found depicted with much simplicity and great effect, the scenes of the town life of the Moslem. The prowess of the Arabian Knight, his passion for adventure, his dexterity, his love, and his revenge, the craft of his wives, the hypocrisy of his priests, and the corruptibility of his judges, are all dramatically delineated—far more vividly represented, in fact, than is possible in a book of travels; while gilded palaces, charming women, lovely gardens, and exquisite repasts captivate the senses of the reader, and transport him to the land of wonder and enjoyment."

Mohammedanism is the prevailing religion to-day in Asiatic Turkey, Persia, Afghanistan, Beloochistan, Arabia and Tartary. It exists in Turkey in Europe, in Northern Africa, and to some extent in China, and India, where there are 40,000,000 Mohammedans. There are no Mohammedans in America. The number of adherents to this faith are estimated at 232,000,000.

INFLUENCES OF MOHAMMEDANISM.

While Mohammedanism may have served its purpose in its time, it is not the religion for an advanced condition of the human race. It is a cold, cruel, selfish, heart-

less religion. It does not teach a love for humanity in the broad sense of that word. Its followers have no sympathy, no charity for those who do not believe as they do. The Christian doctrine is love to God and man. The doctrine of Islam is submission to God. That is the meaning of the word Islam. The Christian's faith brings him in communion with God. The faith of Islam makes God a master, rewarding the good and punishing the evil.

The Mohammedan faith teaches that war is just. The following from the Koran encourages war against infidels: "When ye encounter the infidels, strike off their heads until ye have made a great slaughter among them * * * verily if God be pleased, he could take vengeance on them without your assistance, but he commanded you to fight his battles that he might prove the one of you by the other." On the other hand, however, Mohammedanism teaches kindness to the poor. They say alms are a loan to God. It is said the first insane asylums were instituted by Mohammedans.

BRAHMINISM.

Under this name the religious beliefs and practices of 150,000,000 of people may be described. It is the religion of a large part of the population of Hindostan. The Brahminism of to-day is a corrupt form of a very ancient religion, the doctrines of which are laid down in a collection of books called Vedas (knowledge). They are in the form of poems or songs, and are the oldest religious writings in existence. The real belief of the writers of the Vedas cannot be accurately ascertained, as they are very vague and contradictory. Many gods are mentioned, and sometimes one is exalted to the first rank, or is supreme, and sometimes another. While this religion is usually classed as polytheistic, there are many evi-

dences that its founders had monotheistic ideas. Edward Clodd, F. R. A. S., speaking of this religion, says: "A lifetime could not compass the study of its sacred books, and it is a religion very hard to explain ; indeed, we know far less about it than we know about the old Aryan religion, of which it is the corrupt offspring. It is like a mass of shapely and shapeless things huddled together, which no manner of art could arrange into a well-set whole."

The Vedas seem to teach a worship of the phenomena of nature regarded as personal beings with supernatural power. These impersonations of nature have the general name of *deva* (shining ones). Probably the first phe-

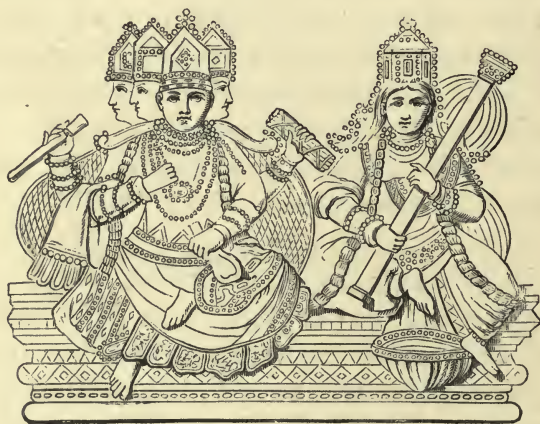


FIG. 138.—BRAHMA AND SAWARASTI.

nomenon which had a reverential effect on their minds was light. But all the powers and phenomena of nature, as earth, fire, the sun, the moon, day, night, dawn and death, were in turn personified. *Indra* was the God of the atmosphere, *Varuna* of light, or heaven, *Agni* of fire, *Savitri* of the sun, *Soma* of the moon. Among these the chief were Indra and Agni.

The word Brahma, from which the name of this reli-

gion is derived, has two significations. The neuter form of the word designates the universal Spirit or cause of all existence. It is defined as "that which is visible, unseizable, without origin, without either color, eye, or ear, eternal, manifold, all-pervading, undecaying—the wise behold it as the cause of created beings." The human soul is regarded as a portion of Brahma, and after death is compelled to pass through the bodies of other animals until the man gets a correct idea of Brahma and the soul. Then, and not until then, can his soul be reunited to Brahma. In the second sense, Brahma means one of the three gods composing the Hindoo Trinity, which I shall next describe.

The engraving shows the ordinary form of Brahma, who is represented with four heads. He is accompanied by Sawarasti, the goddess of poetry, eloquence, and the fine arts. Brahma has no temples dedicated to him distinctively. His symbol is earth, and his pictures are usually red, or of a reddish hue. Vishnu as *preserver*, and Siva as *destroyer*, are much more worshiped. The symbol of Vishnu is water, and his pictures are usually dark blue. He is represented under many forms. In the engraving he is Narayana resting on Shesha, the thousand-headed serpent. The symbol of Siva is fire. He is represented sometimes with one, sometimes with five heads, and wearing a necklace of human skulls. Usually he rides a white bull. His wife Kali delights in blood. Her pictures are painted black. His son Ganesa (wisdom) is represented with the head of an elephant.

About seven hundred years before Christ, a new religion started in India called *Buddhism*, and after this arose a belief in a trinity of gods, composed of *Brahma*, the creator; *Siva*, the destroyer, and *Vishnu*, the restorer. This Trimurti, or Divine Triad, as it was called, seems to

have arisen from an effort to unite the people of India against the new religion-(Buddhism) which was fast gaining ground. The gods Brahma, Siva and Vishnu had been worshiped respectively in different parts of the country. This new compound god was represented by images having three faces. They are to be seen in India to-day, and are still the objects of worship.



FIG. 139.—VISHNU ON HIS SERPENT COUCH.

But neither of the three gods in this trinity held high rank in the Vedas. There is a foundation, however, for the belief in a trinity in the saying “that the highest being exists in three states,—that of creation, continuance, and destruction.”

THE VEDAS.

The Vedas are supposed to have been composed at different periods of time. The one which discourses of Brahma, and which may be considered the text book of Brahminism, is known as the *Laws of Manu*. It is supposed to have been one of the later books, and written about 900 or 1000 B. C. The supreme being, according

to this work, is Brahma. The following extract from this book is interesting, as showing their ideas of creation :

“The universe existed in darkness, imperceptible, undefinable, undiscoverable, and undiscovered ; as if immersed in sleep. Then the self-existing power, undiscovered himself, but making the world discernible, with the five elements and other principles, appeared in undiminished glory, dispelling the gloom. He whom the mind alone can perceive, whose essence eludes the external organs, who has no visible parts, who exists from eternity, even he, the soul of all beings, shone forth in person. He having willed to produce various beings from his own divine substance, first with a thought created the waters, and placed in them a productive seed. The seed became an egg bright as gold, blazing like the luminary with a thousand beams, and in that egg he was born himself, in the form of Brahma, the great forefather of all spirits.

“In that egg the great power sat inactive a whole year of the creator, at the close of which, by his thought alone, he caused the egg to divide itself, and from its two divisions he framed the heaven above and the earth beneath ; in the midst he placed the subtile ether, the light regions, and the permanent receptacle of waters. From the supreme soul he drew forth mind, existing substantially, though unperceived by sense, immaterial ; and before mind, or the reasoning power, he produced consciousness, the internal monitor, the ruler. And before them both he produced the great principle of the soul, or the first expansion of the divine idea ; and all vital forms endued with the three qualities of goodness, passion, and darkness, and the five perceptions of sense, and the five organs of sensation. Thus having at once pervaded with emanations from the Supreme Spirit, the minutest portions of fixed principles immensely operative, con-

sciousness, and the five perceptions, he framed all creatures.

“Of created things, the most excellent are those which are animated, those which subsist by intelligence ; of the intelligent, mankind ; and of men, the sacerdotal (priestly) class ; of priests, those eminent in learning ; of the learned, those who know their duty ; of those who know it, such as perform it virtuously ; and of the virtuous, those who seek beatitude from a perfect acquaintance with Scriptural doctrines.”

Some very singular doctrines are taught in this book. A few random quotations will illustrate this fact. The *reason* for such whimsical and absurd principles are incomprehensible to a Western mind.

“If he seek long life, he should eat with his face to the east ; if prosperity, to the west ; if truth and its reward, to the north.”

“The twice-born man (a Brahmin) who has intentionally eaten a mushroom, the flesh of a tame hog, or a town cock, a leek, or an onion, or garlic, is degraded immediately.”

“Flesh meat cannot be procured without injury to animals, and the slaughter of animals obstructs the path to beatitude ; from flesh meat, therefore, let man abstain.”

“Sacred learning, austere devotion, fire, holy aliment, earth, the mind, water, smearing with cow-dung, air, prescribed acts of religion, the sun, and time, are purifiers of embodied spirits.”

“In lawfully tasting meat, in drinking fermented liquor, in caressing women, there is no turpitude ; for to such enjoyments men are naturally prone, but a virtuous abstinence from them produces a signal compensation.”

“No sacrifice is allowed to women apart from their husbands, no religious rite, no fasting ; as far only as a wife honors her lord, so far is she exalted in heaven. Let

her emaciate her body by living voluntarily on pure flowers, roots and fruits ; but let her not, when her lord is dead, even pronounce the name of another man."

CASTES.

From very early times the Hindoos have been divided into distinct classes called *castes*. The highest caste included the Brahmins, or priests, and other educated persons ; the Kshatriyas, or those who attended to governmental affairs ; the Vaisyas, or merchants and farmers ; the Sudras, or laborers, and the Pariahs or outcasts, the lowest and most degraded of all. These castes maintained their distinctness with great care. If one married into a caste below him, he lost his place in the caste to which he belonged. This arrangement is opposed to progress, and largely accounts for the inferior position India holds to-day among nations.

The Brahmins were the especially favored caste in the laws of Manu. If they committed crime, the punishment was lighter than that inflicted on other men for the same crime, and crimes committed against Brahmins were punished severely. One who struck a Brahmin must remain in hell a thousand years, or if he treated him disrespectfully, or overcame him in argument, he must fast all day and prostrate himself before him.

Next to the Brahmins, cows have from early times been held in great reverence. The man who kills a cow, or eats the flesh to-day in India, has committed a great crime. In very early times, however, there is evidence that beef was used as an article of food. The laws of Manu imposed a penalty for killing cows, as shown by the passage: "All day he must wait on a herd of cows, and stand quaffing the dust raised by their hoofs ; at night, having servilely attended them, he must sit near

and guard them. Free from passion, he must stand while they stand, follow when they move, and lie down near them when they lie down. By thus waiting on a herd of cows for three months, he who has killed a cow atones for his guilt."

TRANSMIGRATION OF SOULS.

The doctrine of transmigration of souls is taught in the book of Manu. It teaches that there are three qualities of soul which give it: (1) A tendency to goodness which leads to knowledge, and to it belong the study of Scripture, devotion, purity, self-command, and obedience. Souls possessing this quality in the highest degree, rise after death to the conditions of gods; (2) A tendency to passion, leading to desire, and from which proceed hypocrisy, anxiety, disobedience and self-indulgence, and such souls after death pass into the bodies of other men; (3) A tendency to darkness, leading to sensuality, and producing avarice, atheism, indolence, and all acts which a man is ashamed of. Souls in which this quality predominates pass after death into beasts and vegetables.

For great sins, the soul passes a number of times through the bodies of dogs, insects, snakes, etc., the transmigration having a relation to the crime, as one who steals meat will become a vulture, if he steals grain, a rat, and so on.

They considered disinterested goodness, that is, the doing good from the love of God, and not from the hope of reward, as the highest virtue. A man who does good only from hope of reward, will receive the lowest place in heaven.

It was the practice for a long time in India, and only abolished about thirty years ago, for the widow to burn herself alive on the funeral pile with the dead body of

her husband, or separately, if he died in a distant place. This was called the rite of *Suttee*. It was based upon the teaching of some of the later sacred writings. They believed that if a woman did this she would be exalted to a high place in the other world, and if she did not, her soul would appear in the body of some female animal. This custom was based on a mistranslation of a Vedic passage.

The religion of the Hindoos to-day, and the present form of Brahminism, is quite different from that taught in the Vedas. It is but little else than idolatry. There were a great many good points in the doctrines of the Vedas. Many of their precepts were of the highest order of moral teaching. But the ignorant masses never could grasp the idea of a God that had no material form, and the morality was too high for them, hence the degradation of Brahminism from a spiritual worship of supreme powers, to a worship of images, and a system of forms and ceremonies.

NUMBER OF IDOLS.

The Hindoos of to-day have a great many idols, and a special worship for nearly every month of the year. April is their first month, and during this month bands of singers go early in the morning from house to house, singing hymns to the gods. The women worship the river Ganges, offering it flowers, and bathing in it. They worship the cow, bathing her feet in water, and anointing her head with oil. They dedicate pitchers to the spirits of their ancestors.

In May the women worship the goddess of babies. The messenger of this goddess is a cat, and they bring their infants to be blessed by an old woman in presence of an image of this goddess.

In the month of June they bathe the image of Juggernaut (Lord of the Universe). The images which represent this god are remarkable for their hideousness. The worship of this god destroys for the time being, the distinctions of caste. The river Ganges is also worshiped in this month by all the people who offer sacrifices, and bathe in it, confessing their sins before plunging into the water. Caste disappears here also for the time.

In July there occurs the ceremony of drawing the car of Juggernaut. These cars are sometimes fifty feet high, and are drawn by hundreds of men, they believing that every one who pulls the rope will go to heaven when he dies. Sometimes the crowd is so great that in the confusion some persons are killed by falling under the wheels of the car.

In August they have a feast in the preparation of which no fire must be used. Serpents and the cactus-tree are also worshiped.

In September occurs the great feast of the worship of Doorga, wife of Siva. The idol representing Doorga has three eyes and ten hands. The ceremony is costly, and can only be participated in by the rich people. Presents are made by the rich to the poor, a great dinner is served free to all, and the people visit each other and give entertainments, with music and dancing.

October, November and December are not noted for special kinds of worship. In January religious bathing is in order, and the Brahmins read and expound the sacred books to all. In February there are festivals to the god Krishna, and the month of March is devoted to ascetic exercises. These consist in various modes of self-torture ; one of these is the swinging by hooks thrust into the flesh. A post twenty-five feet high is erected, and on the top is a cross-beam turning on a pivot. From the ends

of this beam, men are hung by hooks thrust into their backs, and whirled around rapidly a number of times. Some thrust iron rods through their tongues, and others make holes in their tongues and draw living serpents through them. Many other modes of self-torture are practiced, the very recital of which is sickening.

The statement frequently made that Hindoo women throw their children into the Ganges is denied by good authority.

A REFORMATION.

A reformed Brahminism sprang up in India a few years ago, and is meeting with a degree of success. They call their religion Brahmo Somaj, or Progressive Brahminism. It originated with Rammohan Rai (b. 1772), a noted man of India. They have formulated a creed, of which the following is an abridgement :

1. The book of nature and intuition supply the basis of religious faith.
2. Religious truth found in any book written by men is accepted.
3. The religious condition of mankind is progressive.
4. The fundamental doctrines of our religion is the basis of every true religion.
5. We believe in one Supreme God, in the immortality and progressive state of the soul, in repentance as the only road to salvation, in the efficacy of prayer, and in praying for spiritual welfare, in the providential care of a Divine Father, in love to God, and the performance of the works He loves, in public worship in any convenient place.
6. We do not believe in pilgrimages, penances, rites and ceremonies, and make no distinction of caste.

They have a large chapel in Calcutta, and hold services every Sunday evening. While they have but about 3,000 members, the greater part of the educated class of Bengal sympathizes with the movement.

BUDDHISM.

This religion, which has more followers than any other in the world, and has shown more zeal in making converts than any other except Christianity, originated about six hundred years before Christ in Northern India. Its founder was a prince named Siddartha. He is often called Sakya, this being the name of his family, and sometimes Sakya-Muni (Muni meaning *solitary*, probably allied to *Monos* the Greek word from which monk is supposed to have been derived), also Gautama, which is the name of the race to which his family belonged. The name, Buddha, from which comes the name of the religion, is a title assumed by this prince ; it means " The enlightened."

It is said the prince was distinguished very early in life by his intellectual qualities, and his pious and meditative disposition. It seems that it was customary in the early days of Brahminism for men who wished to become very religious to live as hermits, and engage in prayer and meditation. The father of the young prince, fearing from the disposition of his son that he might adopt such a life, had him married when very young to a beautiful princess, and surrounded him with all the luxury the court of a king could afford. But the prince is unhappy. He broods over the follies of life, and longs for a condition of peace, and to know the truth. When thirty years of age he escapes from his father's court and begins the life of a religious mendicant, or beggar. Said he, " I will never return to the palace, until I have attained the sight of the divine law, and so become Buddha."

He first seeks out the Brahmins, or priests, and listens to their teaching, but finds no satisfaction there. However, he gives their doctrine a fair trial. He practices their religion strictly for six years, and is satisfied that the road to peace and perfection does not lie in that direction.

He then retires and leads the life of a hermit, and here amidst the solitude of his own meditations the great light dawns upon him, and he arrives at the true system of religion. He is now moved with a desire to teach the world the new truth he has discovered, and he goes forth to preach. He makes many converts, but meets also with much opposition. For forty years he travels and preaches throughout Northern India.

Thus taught and lived this remarkable character who is sometimes called the "Christ of India." He died at the age of eighty years, and his body was burned with great pomp. There was much contention for the ashes of his body, so great was the reverence he inspired in his followers. Finally they were divided into eight parts, and a *tope* (monument) was erected over each part by their possessors.

Sakya himself wrote nothing, but after his death, his disciples, who had committed his teachings to memory, met in council and reduced them to writing. Missionaries were sent to different countries, and in the course of time the new religion had spread over a large part of Asia. To-day it is the religion of about 400,000,000 of people, or more than one-third of the population of the globe. It is the religion of two-thirds of the people of China, the prevailing one in Japan, and nearly the whole of Eastern Asia. Strange to say, in Hindostan, the land of its origin, it has very little hold.

DOCTRINES OF BUDDHISM.

I shall try to present in brief the leading doctrines of Buddhism. It has been called atheism, a system denying God and immortality, but this is not precisely the truth. Sakya, like the author of Ecclesiastes, saw that the world was but vanity of vanities, that there is nothing perfect,

nothing new under the sun, a perpetual round of life, growth, decay, and death. He longed to be freed from such conditions. By study and meditation and seclusion from the world, he thought he had at last lifted himself above it, and attained a knowledge of the truth ; in other words, he had become Buddha, or the knowing one. In this consisted his atheism. He elevated himself, a man, to the position of a god, and taught that men could do this by virtue and self-denial. But he did not deny the existence of gods. He accepted the doctrine that there were three worlds : " The eternal world of absolute being ; the celestial world of the gods, Brahma, Indra, Vishnu and Siva ; and the infinite world, consisting of individual souls and the laws of nature." The world of absolute being he called Nirvana, and of this he says we know nothing, but it is that which we may attain.

There has been much dispute over the meaning the Buddhists attached to *Nirvana*. The majority of scholars are of the opinion that by Nirvana they meant annihilation. But good authorities deny this. They say that it means a state of rest, a state in which all desire ceases and all passions die, that it is nothing to our present conceptions, a state wholly opposite and different from anything we know, that, while all present life is change, Nirvana is stability.

The Brahmins believed that God was everything, and man nothing, that man would be absorbed in God. Buddhism believes in the elevation of man to the condition of gods. They believe existence to consist of souls and laws, and for souls to know the laws and obey them, was their emancipation.

Buddha laid down four fundamental truths :

" 1. All existence is evil, because subject to change and decay.

"2. The source of this evil is the desire for things which are to change and pass away.

"3. This desire, and the evil which follows it, are not inevitable; for if we choose, we can arrive at Nirvana, when both shall wholly cease.

"4. There is a fixed and certain method to adopt, by pursuing which we attain this end, without possibility of failure."

Then follow eight rules for attaining this end :

"1. Right belief, or the correct faith.

"2. Right judgment, or wise application of that faith to life.

"3. Right utterance, or perfect truth in all that we say and do.

"4. Right motives, or proposing always a proper end and aim.

"5. Right occupation, or an outward life not involving sin.

"6. Right obedience, or faithful observance of duty.

"7. Right memory, or a proper recollection of past conduct.

"8. Right meditation, or keeping the mind fixed on permanent truth."

Then there are ten commandments, five of which apply to all men, and five which apply to monks only. The five which apply to all men are : "1. Do not kill. 2. Do not steal. 3. Do not commit adultery. 4. Do not lie. 5. Do not become intoxicated." The other five are : "1. Take no solid food after noon. 2. Do not visit dances, singing, or theatrical representations. 3. Use no ornaments or perfumery in dress. 4. Use no luxurious beds. 5. Accept neither gold nor silver."

They teach a high morality, and inculcate a love for humanity. It is the duty of a Buddhist to entertain strangers, to give to the poor, to attend the sick, to be kind to animals, to plant shade trees and dig wells for travelers, to love their enemies, to persecute no one, to pay obedience to superiors, and to show reverence for age, to despise no other religion, to govern their passions.

They believe in the doctrine of transmigration of souls, the human soul arriving at last by obeying the laws

of nature, at Nirvana, or the state of peace, of rest. Polygamy is not approved, but tolerated, and women are better treated than among the Brahmins.

There are among them a great many monks, or mendicants, who subsist upon the charity of the people, and who lead a life of abstinence and self-denial, and whose duty it is to teach the people, and read the Scriptures, or sacred writings, to the assembled multitudes. The Buddhist holds that it is natural for man to pray. In some places all the people leave their occupations and meet in the public squares and streets, and kneel in prayer. They believe also in open confession of sins and in adoration of statues of Buddha, and of his relics.

MONASTERIES AND RELICS.

The relics of Buddha are kept with great care. The topes, or shrines for relics are in the form, sometimes of columns forty feet high, and highly ornamented, and again of immense dome-shaped buildings of brick and stone. The tooth of Buddha is kept in Ceylon in six cases, the largest of which is of solid silver, and six feet in height. The others are adorned with precious stones. There are also many temples cut in the solid rock, some of which date back 200 years before Christ. Monasteries are also numerous. The monks shave their heads, wear a robe tied around their waists with a rope, beg their food from house to house, and take vows of celibacy, poverty and obedience.

BUDDHISM COMPARED WITH CHRISTIANITY.

Buddhism has been called the "Protestantism of the East." James Freeman Clarke shows the resemblance to the Romish Church, and asks, Why not call it the "Romanism of the East?" He then goes on to show that in its



BRONZE STATUE OF BUDDHA, AT DAIBOOTS, JAPAN, 40 FEET HIGH AND FINELY FINISHED.
THE TEMPLE SUPPOSED TO HAVE COVERED IT HAS DISAPPEARED, AND THE STATUE
STANDS ALONE IN A WILD SPOT, THE WONDER OF VISITORS.

forms, it resembles Roman Catholicism, but in spirit Protestantism.

So close is the resemblance in form to Romanism, that Father Bury, a Portuguese missionary, after seeing the worship in a Chinese temple, exclaimed, "There is not a piece of dress, not a sacerdotal function, not a ceremony of the court of Rome, which the devil has not copied in this country."

But, while Buddhism in its system of monks, its adoration of relics and saints, its chanting of prayers, its burning of incense and custom of confession to priests resembles Romanism, there is a deeper relation between it and Protestantism, as will be seen from the following comparison made by the author of "Ten Great Religions:—"

"The human mind in Asia went through the same course of experience afterward repeated in Europe. It protested in the interest of humanity, against the oppression of a priestly caste. Brahminism, like the Church of Rome, established a system of sacramental salvation in the hands of a sacred order; Buddhism, like Protestantism, revolted, and established a doctrine of individual salvation, based on personal character. Brahminism, like the Church of Rome, teaches an exclusive spiritualism, glorifies penances and martyrdom, and considers the body the enemy of the soul. But Buddhism and Protestantism accept nature and its laws, and make a religion of humanity as well as of devotion." He goes on to draw further comparisons, but this is sufficient for the purpose here.

One may note here also the resemblances between Buddhism and Christianity, as contrasted with Brahminism and Judaism. The characteristic feature of Buddhism was its universal charity, and in this sense it was a reaction against the formalism and exclusiveness of Brah-

minism, just as Christianity was a reaction against the exclusiveness of Judaism.

INFLUENCE OF BUDDHISM.

What is the good and what is the evil in Buddhism, and what has it done for the human race? What part has it taken in the progress of civilization? We should judge of a religion as we would judge of a tree, by its fruits. From what little I have given of the system, the reader will say, in its aim it is good. Sakya was a good man. His teachings and his life show the lover of humanity, and for many reasons he seems to deserve the title of "the Christ of India." But the system has signally failed to accomplish good results, although its intentions have been good. It has failed to establish a good condition of society, or a good government. The countries in which it prevails have not been marked by strides of progress, like those which have been imbued with Christianity. There seems to be something defective about the system, some weak spot in its foundation, something constitutionally wrong.

Does not the defect lie in this—that it is wholly a selfish religion? Its devotees do good to save their souls from misery, and not from the *love* of doing good. Many so-called Christians doubtless act on the same principle, but this is not the essential idea of Christianity. Besides, the ideal of the Buddhist is a negation. In fact, all is negation with them; man, God, life, death, eternity, are subordinate to Nirvana, and Nirvana is nothing, or at least *no thing*, something utterly abstract and inconceivable.

The Christian strives for a higher life. He looks forward to an ideal, and that ideal is infinite love. Love then, is its basis, not self-love, but love to God, the highest object of love, and to all His creatures because they are His.

Buddhism tends to lessen the love for life, and this is characteristic of the Eastern nations. This is why they do not progress in civilization. The man who longs to get out of this world, that he may enjoy peace, is not going to do much to better the condition of men in this world. The men who place a high value on human life are the men who are endeavoring to make existence enjoyable. From this class come the inventors, the discov-

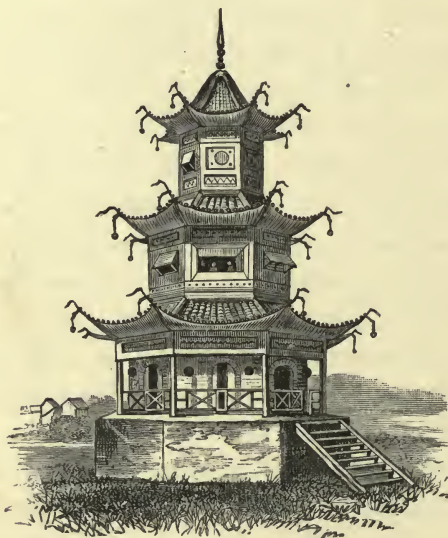


FIG. 141.—CHINESE TEMPLE.

erers, the men who make two blades of grass grow where one grew before, and this is the class which advances civilization.

The Buddhist's heaven is hereafter and away off. The Christian's heaven is both here and hereafter. Buddhism loves man. Christianity loves God and man. Buddhism loves man and works for his good in the next world. Christianity loves man and works for his good in both this world and the next.

Buddhism seems to be losing ground in China, although it is said to be the religion of two-thirds of the Chinese people. It is not the religion of the educated classes. Its priests are ignorant, and it is held in contempt by the Chinese philosophers. Its ancient temples are going to decay, and new ones are not taking their places.

CONFUCIANISM.

This can hardly be called a religion, but rather a system of philosophy and morals. However, as it is the only belief of the most intelligent portion of the population of China, it deserves consideration in this connection.

Confucius is the Latin form of the word *Kong-fu-tse*, which is, in the Chinese language, both a name and a title, *Kong* being the name of the founder of this religion, and *fu-tse* (meaning master or teacher) his title, that is, "Kong the Teacher." This remarkable man was born about the year 551 B. C. As a boy he was said to have been distinguished for his love of learning, and for his great reverence for the ancient laws of his country.

According to a very ancient custom which in the time of Confucius had fallen into disuse, children were required to perform a ceremony upon the death of their parents, and to respect their memory by various acts of homage. Upon the death of the mother of Confucius, he resigned the office which he held under the government, and shut himself up in his house for three years, and devoted his time to study and meditation. The great reverence Confucius paid to the memory of his mother had the effect of reviving the ancient custom of honoring ancestors, and to this day, the Chinese are distinguished for their filial devotion. When his three years of mourning was over, he traveled throughout the country, teach-

ing morality. He soon won many disciples among the more educated classes. He was at first highly honored by the people, and by the government, but in his later years he met with persecution, and at one time was imprisoned, and almost starved. He spent his last years in poverty, and occupied himself in writing books, in which he has left a full exposition of his doctrines. He died at

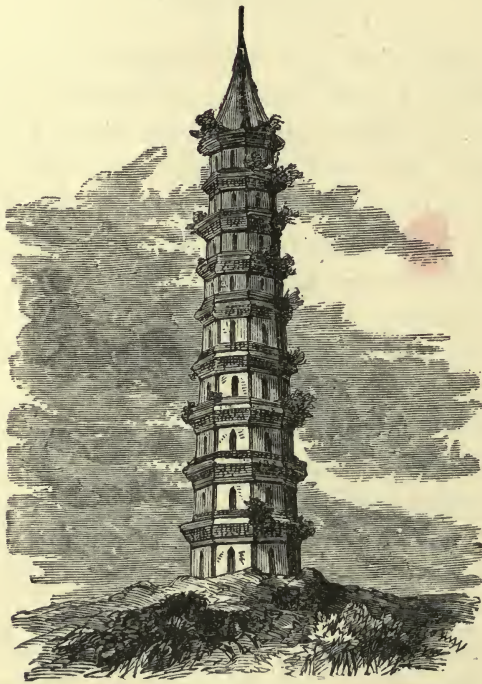


FIG. 142.—CHINESE PAGODA (BECOMING A RUIN).

the age of seventy, and after his death the people united in doing honor to his name. His descendants number in China to-day some forty thousand souls, seventy generations removed from their ancestor, and are the largest family in the world, except the descendants of Abraham. These descendants are highly honored, and con-

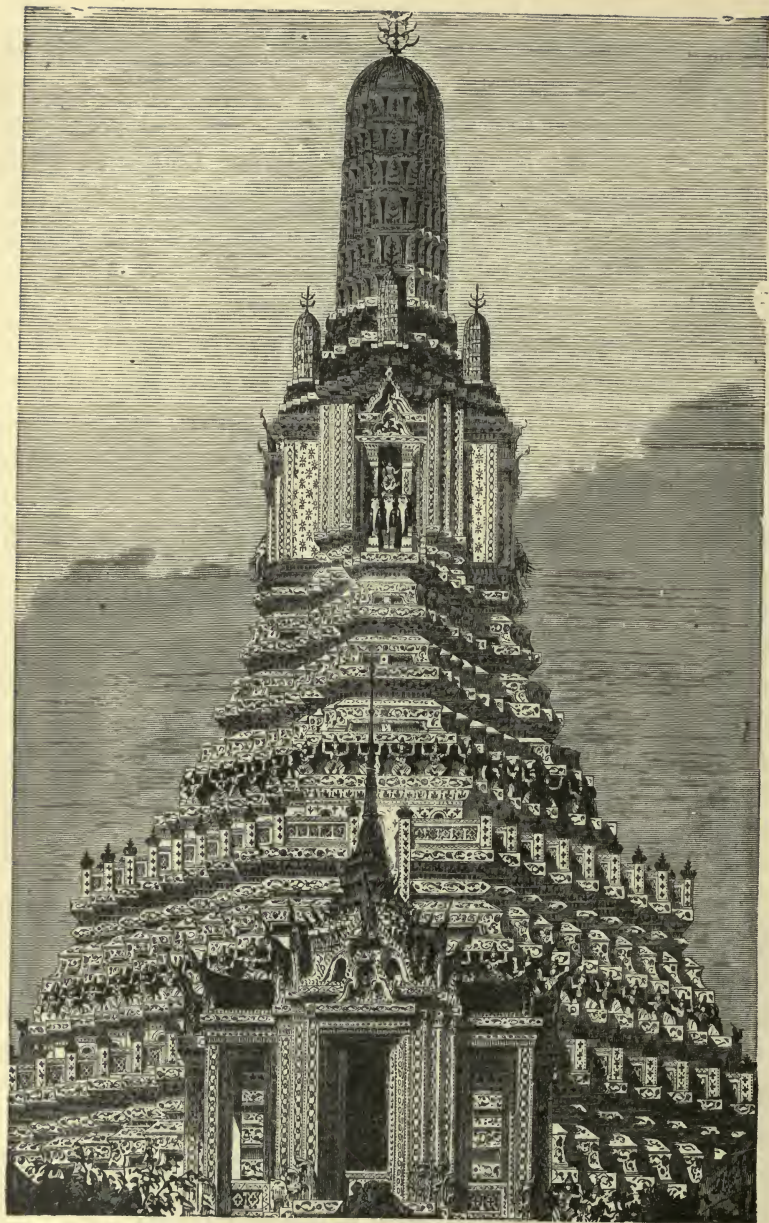
stitute a hereditary aristocracy among the people of China.

The influence which Confucius has exerted through his writings is greater than that of any other man who ever lived, if we except the writers of the Bible. If this is an evidence of greatness, Confucius was one of the greatest men the world has produced.

Confucius was essentially a teacher of morals. He taught honesty, truthfulness, reverence for age and for parents, forbearance, and that all men should be brethren. He laid down the golden rule in a negative form. He said, "Whatsoever you would not that men do unto you, do ye not unto them." He taught kings how to govern with equity. His principles of government were based on the relation of parent to child. He taught that subjects should obey their rulers as children should obey their parents, and rulers should treat their subjects as parents should treat their children. He established no religion unless his doctrine of reverence for ancestors and great men and things of the past, be called a religion. The followers of Confucius to-day worship the spirits of their ancestors, and in this respect Confucianism may be called a religion.

It might be said almost that Confucius himself is to-day the object of worship among the Chinese. There are 1,660 temples erected to his memory, and two great festivals are held each year, on which occasions about 70,000 animals of various kinds are sacrificed, and 27,000 pieces burned on sacrificial altars.

The government of China is based upon the teachings of Confucius, and all of the learned men and government officers are followers of his doctrines. It is said that there are thousands of literary men in China, who can repeat every sentence of his books, and that hundreds



THE GREAT TOWER OF THE BUDDHIST TEMPLE, WAT CHANG, SIAM.
(BANGKOK.)

of his sayings are frequently in the mouths of the masses of the people, and they have had a great influence for good upon the national character.

Confucius did not seem to concern himself with man's future. His whole aim was to benefit man here on earth. His teachings were almost entirely devoid of anything which was not within the compass of what we can recognize with our senses. He said, "While you can not know life, what can you know of death?" The term *Agnosticism* (literally "not knowing") might with propriety be applied to the teachings of Confucius, as it has of late years been applied to the doctrine of a certain school of thinkers, with whom Herbert Spencer is sometimes classed. "The evil in his teaching," says James Freeman Clarke, "is the absence of the supernatural element, which deprives the morality of China of enthusiasm, its social system of vitality, its order of any progress, and its conservatism of any improvement. It is a system without hope, and so has remained frozen in an icy and stiff immobility for fifteen hundred years."

TA-O-ISM AND SINTUISM.

There are three great religions tolerated and practiced in China: Buddhism, introduced from India; Confucianism, and Ta-o-ism. The latter deserves a passing notice; little can be said about it. In fact, it is a difficult matter to ascertain just what it is. It appears under three distinct forms: (1) A system of philosophy, which teaches that being and not being are identical, that Tao as the unnamable is the origin of heaven and earth, and as the namable, the mother of all things, the two being essentially the same. "All things are born of being, being is born of not being." (2) A system of morality, which teaches that duty consists in prudence, and to be

wise one should renounce wisdom, to be good, one must renounce justice, and so on; that is, everything springs from its opposite; good cannot exist without evil, therefore do not drive out evil, or you drive out good. (3) A system of magic and belief in spirits which cannot better be described than by comparing it with modern Spiritualism, or the belief in spiritual rappings, mediums, etc.

The philosophy of Ta-o-ism has been held among different nations. The great German philosopher, Hegel, (b. 1770) held doctrines in philosophy somewhat similar. Hegel maintained that every thought involved a contra-

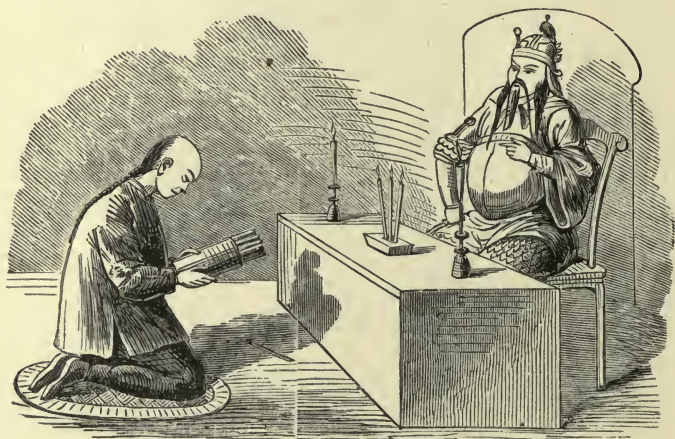


FIG. 144.—CASTING LOTS BEFORE A GOD.

dictory, and by the combination of the two, we rise to absolute knowledge.

The founder of Ta-o-ism was Lao-tse, or Laon-tsze, who was born about 604 B. C., fifty-four years before Confucius. He was a man of altogether different character from Confucius. He was a thinker, and not a worker. He tried to solve the mysteries of a future life, and spent his time in metaphysical speculations. Confucius on the

other hand, as we have seen, did not trouble himself with the supernatural. He is said to have visited Lao-tse, and went away confessing that he did not understand his teachings. But Lao-tse made an attempt at explaining



FIG. 145.—POPULAR JAPANESE GOD.

the supernatural, and by this touched a chord in the minds of the great mass of the people, which the practical ideas of Confucius could never reach. It is a fact in human nature, that ignorant men are attracted by the

marvelous and supernatural more readily than by that which they can see and understand. Tao-ism appealed to the relish for the marvelous in man, and hence the ignorant lower classes were attracted by this form of religion.

The Tao-ist priests are ignorant, yet know enough to be able to impose upon their still more ignorant followers. They pretend by incantations to raise up the spirits of the departed, like our modern Spiritualists, and when a man is sick, they claim to *exorcise*, or drive away the evil spirit which they say is the cause of his disease.

Sintuism, or *Sin-synism* is one of the religions of Japan. Buddhism is also largely prevalent, and the teachings of Confucius have many admirers. The principal object of worship, according to Sintuism, is the great sun-goddess, *Tin-sio dai-sin*. The Mikado, or Emperor of Japan, is held to be the direct descendant of this goddess, and unites in his person all the attributes of this deity. There are also many minor gods and demi-gods. All the great warriors, statesmen, and public benefactors, when they die are elevated to the position of gods.

The principal doctrines of this religion are: "1. Inward purity of heart; 2. A religious abstinence from whatever makes a man impure; 3. A diligent observance of the solemn festival and holy days; 4. Pilgrimages to holy places; 5. According to some, chastising and mortifying the body."



SUPPOSED EVIL SPIRITS.

CHAPTER VIII.

RELIGIONS AND SUPERSTITIONS OF UNCIVILIZED MEN.

The lowest forms of religion take the general name of fetichism, which means the worship of a fetich (pronounced fetish). This word comes to us through the French, from the Portuguese language, and originally meant "magic." When the early Portuguese traders visited the coast of Africa, they described on their return the worship of the natives as "magic." The word fetich is now employed to designate any object in nature or art which is supposed to possess magical, or supernatural power. Fear, respect, or reverence for such objects constitutes fetichism. As an example, take the case given in the chapter on language, of the savage who was sent with a message written on a chip of wood. He supposed the piece of wood had the power of telling the person who received it, what to do. He carried this piece of wood about with him and respected it. To him it was a fetich. Had the message written on it have been an order to give the messenger a whipping, the man would have feared the chip ever after, and perhaps have prayed to it, that it might not harm him again. This would have been worship. When missionaries brought a printing press into the Fiji Islands, and the natives saw it work, they declared at once that it was a god; it was to them a fetich.

Sir John Lubbock has a classification of the religions

of uncivilized people, based upon the estimate in which the Deity is held. It is as follows :

1. *Atheism*, with the understanding that this term should mean, not a denial of the existence of a God, but the absence of any ideas in regard to the subject.

2. *Fetichism*, which he defines as "The stage in which man supposes he can force the Deity to comply with his desires." He illustrates by giving the explanation of an intelligent negro to a traveler, which is substantially as follows : If a man intends to undertake anything of importance, he seeks out a god to prosper his undertaking. Anything will answer, a piece of wood, a stone, or an animal. The new chosen god is presented with an offering accompanied by a vow, that if he prosper the undertaking, the man will worship and esteem him from thence as a god. If the undertaking is successful, the man continues to worship the god, but if it fails, the god is rejected, and a new one sought for.

He refers also to the custom of certain Chinese, who, if they do not receive what they pray for, reproach their gods, tear down their images and drag them in the mud, and if it happens afterward that they obtain their request, they get the image again, wash it clean, and make excuses for having been so hasty. He says further that Fetichism may almost be said to be universal, since it is nothing more nor less than witchcraft.

3. *Totemism*, or *Nature-worship*, in which natural objects, as trees, rivers, lakes, animals, etc., are worshiped. He explains the origin of this kind of worship, in the fact that many nations have long practiced the custom of naming individuals and families after some animal, and that their children would come in time to look upon the animal with reverence and awe. It seems to me, however, that men were led to worship animals and objects of na-

ture, more often from fear or admiration of them, than otherwise.

4. *Shamanism*, in which the gods are more powerful than many of a different nature, and have their abode far away.

5. *Idolatry*, in which the gods are represented by images, or idols.

Before we can understand these seemingly strange human peculiarities, we must understand the nature of the human mind, and inquire into the reason for belief in any supernatural power; in other words, Why is man a religious animal?

But first let it be understood that no man really worships a material object. He believes there is a spirit in it, or in some way behind it, which gives it its power, and it is this spirit which he worships, and not the object itself. In one sense, then, all religion is Spiritualism, a belief in supernatural power, something beyond, above, and superior to matter.

I have several times made the statement that all men have a religion in some form, and, although we see numerous statements of travelers to the effect that certain tribes of savages have no religion, and no form of worship, I still maintain that there are no men who have not some idea, some belief in spiritual existences, and therefore, have a religion in some form. Generally when travelers say a people have no religion, they mean that these people have no belief in some certain god or gods, to whom they give names, and to whom they render homage in the form of prayers and sacrifices. Sometimes travelers say such and such a people have no religion, only the grossest superstition. But superstition is only a low form of religion. Missionaries often say the people they are sent among have no religious ideas. They have

not observed closely, or they do not regard the superstitious notions of these people as religious notions, or their prejudices are so strong that they will not call anything religion that does not agree with their own belief. I prefer in this case to adopt the views of Quatrefages, and say that all men have the rudiments at least, of religion.

But why do men believe in the existence of spirits? Is it not the simplest and most natural way of explaining phenomena? When a man is alive and awake, he moves, he acts; when he is asleep, he ceases to move; when temporarily unconscious as from a blow on the head, or from disease, he ceases to move; when dead, he is quiet. The savage man asks himself, what causes the man to move, and his natural thought is that there is something in him which does it, and when he goes to sleep, or becomes unconscious, or dies, this something has gone out of him. This power is unseen, but it must be there, he reasons, because he sees its effects. He calls that something a spirit. If it is not a spirit that causes these movements, what is it? Man tries to explain phenomena. This is the explanation of the savage man. It satisfies his mind. (See Chapter II, Book I.)

Many strange social customs originate in superstition. It is said that some cannibals believe that they can more effectually vanquish their enemy by eating a portion of his body. Afterward, doubtless, the religious feature of the ceremony was lost in the delight of devouring human flesh. *Charms* have been held in great esteem in all ages, and have not yet lost all their power. The habit savages have of preserving trophies taken in war may have had a similar origin. A tribe in South America dry the heads of their enemies. One in Central Africa adorn their villages by placing skulls on poles.

Savages often have a difficulty in distinguishing a trance

or temporary unconsciousness from real death, and will talk to a dead body, try to administer food, and keep it until it becomes offensive, before they will bury or dispose of it. When one goes to sleep, they say his soul has left his body for a short time. The idea of the im-



FIG. 147. THE VILLAGE OF SKULLS, CENTRAL AFRICA.

mortality of the soul is a natural one to men. How could a soul die, would be a hard question for them to answer.

Now if it is a spirit which animates man, is it not a spirit which causes movements in animals and other ob-

jects? Of course; and many savages believe that animals and inanimate objects have souls. This is why they bury weapons, clothes, and ornaments with the dead, and place food by their graves.

There must be some connection between this belief and the fact that many of the gods of idolators take the form of animals. Many of the grotesque forms of these gods doubtless originate in this belief, that animals may have some supernatural power, and that the god-like spirit in its migrations may exist in the animal.

The belief in a spirit land follows naturally upon a belief in spirits, for the spirits must have a place to dwell. The phenomena of dreams will doubtless explain many ideas of a spirit land, for it is easy to think that when a man is dreaming, his spirit has gone to another world. The man who has been hunting and fishing all day, dreams at night of killing many animals, or catching an abundance of fish; hence the belief in happy hunting grounds, where game is abundant in the next world. If a man goes there temporarily when asleep, will he not go there when death, the eternal sleep, comes upon him?

A British gun-boat a few years ago fired some shells into a crowd of Bedouin Arabs. They never had seen or heard of such things, and as they could not see the vessel from which they were fired, they were wonderfully mystified in regard to their origin. A shell fell and did not explode. A number gathered around it, and examined it with curious eyes. They finally came to the conclusion that the percussion fuse was its eye, and by this means it could guide its course. They determined therefore "to put out its eye," and thus render it harmless. They struck the fuse with their lances, and the shell exploded, killing eleven of them on the spot. This illustrates the savage's idea of phenomena which he cannot

understand. These shells were to the Bedouins living beings with supernatural power.

If we could place ourselves in the position of the lowest savages with no knowledge of natural laws and forces, we would reason and think as they do. Observed in the light of the foregoing facts, the strange beliefs and practices of savage nations cease to be astonishing.



FIG. 148.—THREE FORMS OF THOTH, THE SCRIBE, AN EGYPTIAN DEITY.

The limits of this volume will not permit even a partial enumeration of the many curious ideas and modes of worship among savage and barbarous people. A complete description of all the shades of religious belief and practices of worship would fill a large volume. I shall limit myself to a few of the most characteristic and striking.

THE ESKIMOS.

The Eskimos believe in a future existence, a heaven and a hell. Their idea of a hell is just such as we would

expect such a people to have—a place intensely cold and dark, with snowstorms constantly blowing, and where no seals are found. They have a sort of dim idea of a supreme being, and of a female Deity, who is the special protector of the Eskimo people. They have a superstitious dread of using anything which has been in the house with a dead body, and sometimes when one of their number is dying, they place near him every article which could comfort his last moments, and then close up the house and leave it, thus converting it into a tomb. One traveler relates that they “lay a dog’s head by the grave of a child, for the soul of a dog can find its way everywhere, and will show the ignorant babe to the land of souls.” When a mother dies, leaving an infant, it is buried alive with her, and sickly, aged people are sometimes buried alive to spare them a lingering death.

THE PATAGONIANS.

According to some, the Patagonians have no religion ; according to others, they are polytheists, believing in a great number of gods, some good, and some evil. Each family is under the protection of a particular god, to whom the members of the family go when they die. It is said that when they secure a supply of game after a period of want, they will not eat, until the oldest of their number returns thanks to the unknown Being who has supplied their wants.

The Fuegians are, perhaps, the most wretched people in the world. Their climate is cold and dismal. Hence their religious ideas must be very low. It is said they have no religion, but some of them believe in the existence of a powerful being who lives in the woods. When one of them dies they take the body into the woods, and cover it with brush.

THE AUSTRALIANS.

The Australians seem to have a belief in evil spirits, but have no idea of good spirits. One of these evil spirits they call Arlak, a being in the form of a man who is seen only at night, and is in the habit of catching men and carrying them off. They say he cannot endure a light, hence the natives carry torches, frequently when they go out after dark. They believe that no person ever dies a natural death, but is killed by some evil spirit. They attribute all sickness and misfortune to the agency of evil spirits. They think by breathing deeply, and saying over certain words, they can drive away the evil spirits.

In Southern Australia, it is said the natives believe that the sun and moon were once human beings, and that the stars are children of the moon. An eclipse of the sun or moon is to them a great calamity, and regarded as a forerunner of disease and death.

Of the Hottentots, Rev. J. C. Wood says they "are entirely free from superstition, inasmuch as they have not the least conception of any religious sentiments whatever." Other writers, however, give different accounts. Kolben speaks of their dances as acts of religion, and Sir John Lubbock says, "They seem to have had some notion of a Deity."

THE FIJIANS.

The inhabitants of the Fiji (Feejee) Islands, believe in a great number of gods, each symbolized by some natural object, as a tree, or animal. Each member of the tribe considers himself under the protection of a certain god, and will not injure the object which is its symbol. Says Mr. Hazlewood, "The Fijians consider the gods as beings

of like passions with themselves. They love and hate ; they are proud and revengeful, and make war, and kill, and eat each other ; and are in fact, savages and cannibals like themselves." Their priests pretend to communicate with the gods by throwing themselves into convulsions. They have various methods of foretelling future events, or divination, as it is called. One mode is to take a leaf between their teeth and bite it ; if it be completely severed, it is a good omen, if not, it is bad. They have temples in which they offer food to the gods. But they say the god eats only the soul of the food, and leaves the substance of it, and this is eaten by the people.

There seems to be no morality in their religion. "One of the first lessons taught the infant is to strike its mother," says one writer, and says Mr. Williams, "Murder is not an occasional thing in Feejee, but habitual, systematic, and classed among ordinary transactions." They are cannibals of the worst description. Human life is held in little regard. When a king wished to launch a canoe, ten or more men were killed, that it might be washed in human blood. Children kill their parents before the latter become old and infirm. Mr. Hunt was once invited by a native to attend his mother's funeral. He went, but what was his surprise, instead of finding the mother a corpse, to see her walking in the procession, apparently as lively as any one present. They then proceeded to kill her, and bury the body, the young man saying that it was out of love for his mother, that he thus prevented her from getting old and infirm.

PACIFIC ISLANDERS.

The Maories (Mow-ries) of New Zealand, have a kind of belief in a good and an evil influence. The former they call Atna, but this name is applied also to anything

which they do not understand, as for example, some of the inventions of civilized people. Thus they call a compass an Atna, because it tells the way a traveler should go, a watch also, because they cannot understand its ticking. A species of lizard is called Atna, and is held in great reverence. When one of their number was sick, they said Atna was devouring his insides. The cannibalism of the New Zealanders seems to be a part of their religious faith. They believed that when they ate the bodies of their enemies, they partook of the courage and spirit of their owners, and the more bodies they had eaten, the higher their position would be in the next world. On the other hand, the greatest misfortune which could happen to a man was to be killed, and have his body eaten by an enemy.

The inhabitants of the Society Islands are noted for the number of their idols, which are of two kinds, one being rude imitations of the human form, the other being mere combinations of cloth and feathers rolled around sticks, and not recognizable as idols, except by those who understand their significance. They have gods of the valleys, and gods of the hills, and of particular districts. If in a certain district the ground does not produce bountifully, or is devastated by war, they conclude that the god of that particular district is not doing his duty, and they discharge him and get another. They have one god who is regarded as the special patron of thieves. The natives are special adepts in the art of stealing, but they always ask the help of this god before going on a thieving expedition. If successful, they offer a portion of the plunder as a sacrifice to the god of thieves. They are, however, not very generous in this regard. For example, if one stole a pig, he offered only about an inch of its tail to the god, and ate the rest himself.

THE NATIVES OF GUIANA.

The natives of Guiana believe that all pain is caused by an arrow shot by a spirit called Yauhahu. A body of men are set apart as priests, or sorcerers, whose duty it is to communicate with the spirit world. To prepare a man for this, he must drink a large quantity of tobacco tea, after having fasted for several days. The effect of the fast and the tobacco are to throw the man into a state of unconsciousness. He is then proclaimed to be dead, and his body is exposed to the public view. When he recovers, he is presented with great ceremony, a sacred rattle, which is simply a calabash, or kind of gourd containing a few white stones, the whole painted red, and adorned with feathers. The uninitiated hold these rattles in great dread, and will on no account dare to touch one of them, and are even afraid to go into a house containing one. This sacred rattle is used by the priests, or medicine men, to drive away disease, and to perform other wonderful miracles.

AFRICAN TRIBES.

The Kaffir tribes believe that the spirits of their departed friends return, usually in the form of some animal which is not in the habit of entering their dwellings. Serpents and lizards are the most common forms in which they are said to return. If such an animal enters their houses, they lay a stick gently on its back, and if it shows no signs of anger, they are sure it contains the spirit of one of their friends, in which case they offer a sacrifice; for the reason that the spirit would not have returned unless to give warning that it was not treated with proper respect. Any unusual occurrence is considered with them as an omen for good, or for evil.

The Namaquas have a curious idea concerning the hare. When men were first made, the hare had no cleft in his lip. The moon sent the hare to man with the message: "As I die, and am born again, so you shall die and be born again." The hare made a mistake in delivering the message, so that it conveyed an opposite meaning. The moon was angry at the hare, and threw a club at it as it ran away, and split its lip open, and to this day the hare has a cleft lip, and is always running away, and the Namaquas will not eat the hare, nor even touch one. They are great believers in charms, and have sorcerers, or witch doctors, who make use of various charms in curing diseases. One of their charms is a cap, which, to become effectual, must be worn by the doctor continually until it gets very dirty, then a portion of it is washed in water, and the water given to the patient to drink.

The Shekiani tribe of Africa believe that men and women can be changed into animals. In one instance they tell of a man being changed into a gorilla, and doing great mischief in the neighborhood, killing men, and carrying women away into the woods. Seven days after a child is born, all the young girls in a neighborhood gather at the house, and sing and dance all night. They think if they do not do this, the woman who attended the mother would be changed into an owl, and suck the blood of the child.

The religious beliefs of many savage tribes cannot be actually ascertained, as many savages have a reluctance about making known their ideas upon such matters. Again, their primitive beliefs have been in many cases modified by the teachings of Christianity, and they have a mixed religion, consisting of a belief in an unknown Great Spirit, mingled with many absurd notions about spirits and gods of minor importance. We often read in

accounts concerning the North American Indians, of their belief in the Great Spirit, who is sometimes called Manitou, and one would from this get the idea that the Indians were Monotheists in religion. But there is good reason for saying that all such ideas of a Great Spirit were introduced by missionaries. The word Manitou is said to be a corruption of the French, "bon Dieu" (good God).

CURIOUS BELIEFS, SUPERSTITIONS AND PRACTICES.

Before giving an account of extinct religions, or mythologies, I wish under the above caption to notice some rather miscellaneous points connected, more or less, with the religious worship of the past and present.

The practice of retiring from society to some secluded place, and practicing acts of penitence and devotion, has been characteristic of several forms of religion, both ancient and modern. When a man retired from society, and dwelt entirely by himself, and practiced devotion, he was called an *anchorite*. During the early centuries of Christianity there were a great many of these anchorites, or religious hermits. The persecutions which the early Christians suffered, doubtless drove many into a life of solitude, and perhaps the general corruption of society had much to do with making anchorites of men. Some of them would voluntarily undergo great hardships, wearing scanty clothing, subsisting on the coarsest food and often wear rings of iron and heavy chains, or stand in painful postures through many years. Of the latter class were the so-called "pillar saints," or "stylites" (*stylos*, a column). These men were mostly of Syria. They took up their abodes on the tops of high pillars, where they remained without descending to the ground for years, exposed to all the changes of the weather. The

most celebrated of these was Simeon, or Simon the Stylite. This man remained thirty-seven years upon pillars, with a heavy iron chain around his neck, and his lips constantly engaged in repeating prayers. He commenced at first on a pillar nine feet in height, and then removed from time to time to others of greater height, until he stood on one sixty feet high. Tradition says he frequently limited himself to a single meal a week, and during the forty days of Lent abstained entirely from food. Great

crowds of people came from distant countries to see him. What is remarkable, he lived to the age of seventy-two years. Tennyson has made this remarkable saint the subject of a beautiful poem.

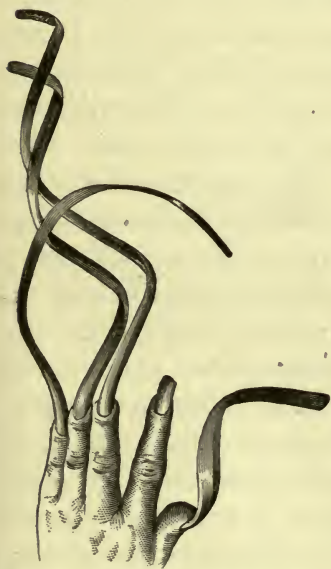
The annexed cut represents the hand of a Chinese ascetic, with the finger nails grown to an extraordinary length.

Persons who denied themselves of physical comforts, under the belief that they were thereby bringing themselves nearer to God, were called *ascetics*. The notion originated probably in

FIG. 149.—HAND OF CHINESE ASCETIC.

the East, and was the result of the notion that matter in all its forms is to be despised, and that one should seek the Absolute, or All, as the only real existence.

The Brahmins and Buddhists of India carried it to great extremes, some standing for years, day and night, some holding up one hand until it became rigid, and the finger nails had grown to enormous lengths, others undertaking journeys of hundreds of miles on their hands and



knees, or by rolling over and over. These practices are still in vogue in India and China. The Anchorites were ascetics in various degrees.

In the early days of the Christian church, Asceticism was practiced as meritorious in the sight of God. It remains to-day in a much modified form in the fasts of the Roman Catholics and others, in the celibacy of the sect called Shakers, and in the practices of some other denominations, as Quakers, Mennonites, etc.

When men retired from public life, and lived in groups, or communities, and engaged in devotional and ascetic practices, they were called monks, and the buildings in which they dwelt were called monasteries. When females retired thus for religious purposes, they were called nuns, and their dwellings, nunneries. The terms cloister, abbey, priory and convent, are applied to both nunneries and monasteries. The whole system is known as monachism, or monasticism. It was practiced among the Jews to some extent, before the coming of Christ. It is a prominent characteristic of Buddhism and Brahminism, and is kept up to the present day by the Roman Catholics. In early times the monasteries were the principal seats of learning, it being the duty of the monks to copy manuscripts, and it is to them we owe the preservation of many very ancient writings. Many of these institutions to-day are engaged in charitable work, and are in the form of benevolent societies.

FAKIRS AND DERVISHES.

The Fakirs of India and the Dervishes of Turkey and Persia belong to the class of monks, or ascetics. The word Fakir is from the Arabic, and means "poor." They often go naked, or clothed in the most filthy rags; smear their bodies with ashes; receiving only the poorest

food without asking, or giving thanks. The word Dervish is from the Persian, and means the same as Fakir. The Dervishes are mostly Mohammedans, and are divided into many brotherhoods, or orders, living in convents. They are noted for their peculiar religious dances, in which they whirl round and round with great rapidity.

The Fakirs carry self-torture to extremes, and frequently end their lives as lunatics.

CURIOUS SECTS.

A curious sect sprang up in the second century, under the name of *Adamites*. They pretended to be re-established in a state of innocence, as Adam was before his fall. They did not believe in marriage, and attempted to imitate Adam by going naked. This absurd sect did not last long, but in the twelfth century it was revived again, to be shortly obliterated.

The *Amsdorfi*ans were a sect of the sixteenth century who maintained that good works were only obstacles to salvation.

The *Apocarites* were a denomination of the third century, who believed that the soul of man was a part of God. At the same time existed the Arabici, who maintained that both the soul and body died, and rose again.

The *Artotyrites* were an ancient sect of Christians, who celebrated the Lord's Supper with bread and cheese.

The *Cainites* were a sect originating about the year 130. They esteemed Cain, Judas, and other reprehensible characters of the Bible as worthy of great honor. They say that if it had not been for Judas, Christ could not have died to save mankind.

The *Circoncillions*, so-called because of their constantly traveling around, were a band of fanatics who undertook in the early days of Christianity to reform the world.

They would arm themselves with clubs, go around and compel masters to take the place of their slaves, kill creditors and discharge the debtors, calling themselves "vindicators of justice, and protectors of the oppressed." They were very cruel, and would rarely ever kill a man outright, but would break every bone in his body, and leave him to die.

The *Hermiani* were a sect of the second century, who held that God had a material body like man, and that when Christ ascended to heaven, he left his body in the sun.

The *Serpentinians* were a sect of the second century, who had great reverence for the serpent who tempted Eve, claiming that he was the same as Jesus Christ, and taught men the knowledge of good and evil. They distinguished between Jesus and Christ; the former they said was born of the Virgin Mary, and the latter came down from heaven, and was united to him. Jesus was crucified, but Christ returned to heaven. They were in the habit of keeping a live snake in a cage, and allowing it to twine itself around a loaf of bread, which they then broke and distributed among their members.

The *Rogereens* were a sect which appeared in New England about 1677. They held that worship on the first day of the week was a species of idolatry, and that it was their duty to oppose it. They used various measures to disturb persons who were assembled for worship on Sunday.

The *Flagellantes*, or Whippers, were a sect of fanatics who rose about 1260 in Italy. They thought to obtain God's mercy and forgiveness by punishing themselves. They would assemble in great numbers, form processions in which they whipped each other over the naked shoulders, until the blood ran down.

A curious religious sect, or fraternity, existed in India for many years, and in fact, is hardly yet extinct. They are called *Thugs*, from the Hindoostanee word *thuga*, to deceive. Their principal occupation is to band together, and murder people, and appropriate their property. They ascribe their origin to *Kali*, the wife of the god Siva, and in her name exercise their profession. They formerly believed that Kali helped them commit their murders, and disposed of the bodies of their victims by eating them. This she does not do now, because as they say, she became offended when one of their number tried to pry into her proceedings. They were then compelled to bury their victims. Their mode of work is as follows :

They go together in bands of from ten to fifty, in the disguise of ordinary travelers. They have a leader, a teacher, a number whose business it is to deceive and entrap victims, another set who strangle them, and still another whose duty it is to dig graves and bury the dead. When they find out that certain persons have property which they can get, they watch for an opportunity to murder them and steal their goods. Their mode of killing is by strangling with a rope in the hands of two persons, while a third seizes the victim by the feet and throws him forward. They mutilate the bodies before burial to avoid recognition.

The plunder is divided among them, after laying aside a portion for the expenses of certain religious ceremonies, and another portion for the victors and orphans of members of the gang.

They are very superstitious, and consider it unlucky to kill certain classes of persons. They rarely ever kill women. The native and English governments of India have at various times taken steps to suppress this order, and at the present time it is about extinct.

THE MORMONS.

In this connection, mention should be made of the *Mormons*, or, as they call themselves, the "Church of the Latter Day Saints." Their history is an interesting one, but want of space will prevent an extended account. The founder of this singular sect was Joseph Smith, a native of Sharon, Windsor county, Vermont, born Dec. 23, 1805. He was ignorant, superstitious, and of questionable character. He pretended to have had visions, and that an angel informed him where certain golden plates were buried, containing an account of the settlement of America before the time of Christ. These plates were afterward given him by the angel, and a key to them, by which he was enabled to translate the record into English. He succeeded in getting three persons as witnesses to the truth of his claims, these persons signing their names to the "Book of Mormon," as the translation was called. This book contains the doctrines of the church. The opponents of Mormonism say that Smith stole the manuscript of a romance, which was written by a man named Solomon Spalding, and altering it to suit his purposes, published it as the real Book of Mormon.

The new doctrine soon gained followers, and after various persecutions and wanderings, the main body of Saints took up their abode in the Territory of Utah, and founded Salt Lake City.

In 1844 Joseph Smith was killed by a mob in Nauvoo, Ill., where they had established themselves before their final removal to Utah, and Brigham Young became their leader. On his death in 1877, John Taylor was chosen as their leader, or President.

Their doctrines in many respects do not differ from those held by many Christian sects, but one peculiarity is

their belief in, and practice of polygamy. This they defend on moral grounds. Like all other sects, there have been offshoots from the main body, and there are many Mormons who do not believe in polygamy.

Though they have shown a creditable zeal in missionary work, and have by their industry made an otherwise barren country blossom as the rose, they have been guilty of many crimes which shall forever remain as a blot on our American civilization.

Besides their colony in Utah, they have settlements in Idaho, Arizona, and New Mexico, and places of worship in most of the larger cities throughout the United States. They have sent missionaries to almost every portion of the globe, and have brought converts to Utah in great numbers from various parts of the world. The Book of Mormon has been published in English, Welsh, French, German, Italian, Danish, Swedish, Hawaiian and Hindoostanee. They have a number of published works, and numerous periodicals in this country and in Europe. For a full account of Mormons, see *Beadle's Life in Utah, or the Mysteries and Crimes of Mormonism*.

PERSECUTIONS.

The history of persecutions for religious opinions, forms a curious though horrible chapter in the history of the world. The first Christians were persecuted by the Jews, and later by the Romans. Historians generally reckon ten great persecutions by the Romans, beginning with that of the Emperor Nero, whose cruelties were mentioned in a former part of this chapter. The last persecutions lasted ten years, beginning 303 A. D. Houses filled with Christians were set on fire, and multitudes were surrounded with ropes, and pulled into the sea. It is said that 17,000 were killed in one month.

But the most horrible of all was the persecution of Christians by those professing the same name. When the Reformation began, and thousands became alive to the corruption of the Romish Church, then began the terrible persecutions known as the Inquisition. This was a kind of court established by the Roman Catholic Church for the examination and condemnation of those accused of heresy. Generally an accusation was equal to a condemnation, and that meant torture, until the victim renounced his opinions, or death came to his relief. The details of the tortures of the Inquisition are too sickening to relate. Men and women were hung by the hair, and by the feet, their flesh torn with pincers, roasted over a slow fire, stuck with pins and needles, put into chimneys, and suffocated with burning wet hay, filled with wine by pouring it into their mouths through a funnel, had air pumped into them with bellows until their bodies burst open, branded with hot irons, and most cruelly tortured in a hundred other ways. (See the rack, page 223). It is said that altogether, fifty millions of Protestants were put to death in the past by the Papists for their religious opinions.

But the Papists were not the only persecutors. In many cases the Protestants when in power persecuted and put to death the Papists. The Puritans were persecuted by the established (Protestant) Church of England, and they in their turn persecuted the Quakers.

BELIEF IN WITCHES, SPECTERS, ETC.

The belief in the existence of fairies, brownies, imps, hobgoblins, specters or ghosts, witches, etc., as well as the notions of modern Spiritualists in regard to the return of the spirits or souls of the departed, and their holding communication with the living, are the results of ignorance of

natural laws coupled with a desire on the part of men to account for all phenomena of nature. It is not my purpose to refute any arguments which may be used in favor of such beliefs, but simply to record as one of the peculiar characteristics of human nature these curious ideas and some of the practices resulting from them, which have existed and which even among civilized people exist at the present day. An attempt at an explanation of the phenomena of ghost seeing will be given in the chapter on Mind.

It may be proper, first, to give an explanation of some of the terms used in this connection. *Fairies* are imaginary beings, believed to exist in lonely places, usually in the form of little women, who dance, spin and comb their long hair. They steal children, leaving ugly and stupid ones in their place, cause nervous diseases, and perform other wonderful feats. The green circles of grass which are sometimes observed in pastures, have been attributed to the dancing of fairies. These circles go by the name of fairy rings, and are caused by the growth of a species of mushroom, which spreads its seeds in circles, and the decay of the first growth of the mushrooms enriches the soil where they stood, and causes the grass to grow more luxuriantly. *Brownies* are domestic spirits, who occupy themselves at night in performing sundry duties about the house, such as churning, threshing grain, etc.

An *imp* was simply a little evil spirit, or devil. The word formerly meant a child, a young person. A *hobgoblin* generally meant a frightful apparition or ghost. It is sometimes applied to a certain spirit well known in England as Robin Goodfellow. *Ghost* is an old Anglo Saxon word, which meant *breath*, and by figurative use, *spirit*, *mind*, *genius*. It is now mostly used as it is in this connection, to denote an imaginary being, supposed to be the

spirit of a dead man returned to earth—the same as specter.

WITCHCRAFT.

Witches were those who could perform supernatural acts. In all ages of the world and in every country there have been men and women who pretended to hold converse with spirits, and be able thereby to foretell future events, to perform miraculous acts, in other words, to be possessed of supernatural powers. The origin and meaning of the word is, that which performs, or, simply an agent, or doer. When Christianity was introduced the idea of a personal devil or evil spirit became prevalent throughout Europe, and those who pretended to work magic were thought to be in league with the devil, from whom they received their power. This idea was a natural one, that all superhuman powers not proceeding from God were necessarily attributable to the devil. Before this, when a witch or magician worked any one mischief, he or she was punished, but now the mere ability to work supernatural results was considered as evidence that the person had given himself over to the devil. Consequently he had renounced God and his people, and was to be regarded with horror. Hence arose the belief in witches, which continued until within comparatively recent times. "Witchcraft" briefly means the practices of witches. Witchcraft was believed in almost universally by the people of Europe up to the sixteenth century, and, to a considerable extent, even until the middle of the eighteenth century, and the idea is not by any means eradicated among the most civilized nations of to-day. In the sixteenth century vast numbers of reputed witches were convicted every year and condemned to be burned. Strange to say, the majority of those who were condemned as witches were entirely inno-

cent of any attempt at working magic, but those who were insane, or afflicted with epilepsy, or in any way acted strangely, were accused of being witches and arrested and tried. They had many absurd tests for discovering witches. One was to weigh the person against a copy of the Bible, and if guilty she would outweigh the book ; another was to compel the supposed witch to repeat the Lord's Prayer. This, no witch, they said, could do without omitting some word or words. A witch, they said, could not weep more than three tears, and those only out of the left eye. Another test was to bind the person and throw her into a pond of water, and if guilty, she could not sink. It is a curious fact that women and girls were nearly always the reputed witches. In Geneva, in 1515, five hundred persons were executed as witches within the space of three months, and a thousand within a year in the diocese of Coma. It is estimated that in Germany alone a hundred thousand were put to death for witchcraft. It seems that when a rage for burning witches once started in a community, it did not stop until vast numbers had been accused and condemned. At first the persons accused were crazy old women, but as the frenzy rose no one was safe. If one man had a grudge at his neighbor and wished revenge, he would accuse him of being a witch, and he was at once arrested, tried, and condemned to be burnt or hung.

The last great craze of this kind is known as the "Salem witchcraft," and appeared in Salem, Massachusetts, among the Puritan settlers, in 1692. The beginning of the delusion seems to have been somewhat as follows: Two girls residing in the family of a clergyman were seized with convulsions and complained of being pricked with pins in the hands of unseen beings. They accused an Indian girl of being a witch, and from this point the delusion spread rapidly. Many were accused and put to torture to compel

them to confess. As was always the case on such occasions many did confess themselves to be witches just to escape torture. The delusion lasted six months, and about twenty persons were put to death.

The belief in the existence of ghosts, witches, etc., is common in all uncivilized countries to-day and among the lower classes in Europe, and, to some extent, among the ignorant population of our own country. The believers in Spiritualism are numbered by the million in America. The belief in "signs," or omens, is very prevalent even to-day, and this is but a species of superstition. Certain days are considered unlucky; certain trivial occurrences are fore-runners of certain events. There will not be a reader of this book who can not say that he has heard some person affirm that it would be unlucky to be married on Friday, or to begin a new kind of work on that day. A hundred such examples might be given showing that superstitious notions have a strong hold upon society everywhere. It will be many years before we are rid of them.

SUPERSTITIONS OF INDIA AND CHINA.

The Hindoos are extremely superstitious. All forests, caves, and old ruins, they believe to be haunted. They are frequently terrified by the rustling of leaves, the cracking of walls or furniture, or the scratching of a dog or cat. If the wind blows out a light, they think it is a spirit. The Chinese are also very superstitious. Many of them think if a man commits suicide, he is driven to it by a spirit, and the house in which he lived must be exorcised. This is done by the Taouist priest, taking a black dog, cutting off his tail, and dragging him into every corner of the house, then kicking him out at the front door. This proceeding drives away the evil spirit. They believe in the significance of dreams, lucky and unlucky

days, witches, spirit rappings, etc. They think that all lunatics are possessed with devils, and such a thing as a lunatic asylum is not known. Their daily conduct in the most common matters, is shaped by superstitious notions. One of their gods is a monkey, who they say was hatched from a boulder, and having learned the language and manners of men obtained a place among the gods.

ORIGIN OF FAIRIES, ELVES, ETC.

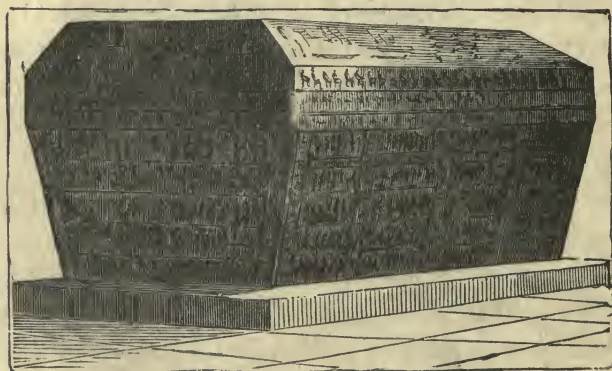
The fairies, elves, brownies, hobgoblins, spooks, etc., of our forefathers, and of the ignorant classes of to-day are but different forms of the minor gods which were said to haunt the hills and woods and houses of the ancients, and of the tribes of modern savages.

These beliefs are but relics of a lower stage of civilization, and we may confidently hope that in the years to come the bright light of science will everywhere shine and dispel the dark mists of superstition, and a knowledge of the one true God, the Creator and Controller of all things, will everywhere prevail. Science is but a knowledge of God's laws, and the more science we have, the nearer we approach the great light of the Universe, and the darkness of superstition recedes farther and farther away.

The transition from a state of superstitious belief to one of enlightened reason, however, must be gradual, like other great changes. The continents were not made in a day, nor the gigantic oaks. The men of France, during the Revolution of 1798, thought to set up reason in opposition to the gross superstition of the day, by a grand declaration and demonstration of freedom from such belief, but they only made fools of themselves in the eyes of the world, and fell into the same errors they were trying to abolish. In their mad fanaticism they

placed a young woman upon a gaily decorated throne, clothed her in gorgeous attire, and fell down and worshiped her as the goddess of Reason, thus returning to the idolatry of the heathen nations.

Another species of superstition which lingers persistently, and which, perhaps, may never be eradicated, is the belief in *good* or *bad luck*. When the most intellectual people think how often they have been favored by fortune far beyond the merit of their plans, or have suffered disaster in spite of the best laid plans, they will realize how nearly impossible it is for humanity to shake off a belief in *luck*.



EGYPTIAN SARCOPHAGUS.

CHAPTER IX.

POLYTHEISTIC RELIGIONS.

RELIGION OF THE GREEKS.

A knowledge of the religious ideas of the ancient Greeks comes to us mainly through the writings of two great poets, Homer and Hesiod. Their works may be considered as the "Bible of the Greeks." Homer wrote, or composed rather, about 800 years before Christ, and Hesiod about a century later.

Hesiod in his *Theogony*, or "Book of the Genesis of the Greek gods," describes three generations of deities. The first generation of gods were impersonations of the powers of nature.

According to Hesiod, the first of all things was Chaos, from which was born the earth, Gaea; the spirit of love, Eros; Tartaros, a place far below the earth, dark and dismal; Erebos, darkness; Nyx, night; Ether, the clear sky; and Hemera, day. From the earth came the starry heavens, Uranos, and Pontos, the sea. Uranos married his mother, the earth, Gaea, and the result of the union was a race of beings called Titans. These were the second generation of gods, and represent a second stage in the development of the Greek religion. They are not so distinctly representative of nature as the first generations, but approach a human character.

The third generation of gods was produced as fol-

lows: The Titans rebelled against their father, Uranos, who threw them into Tartaros and kept them bound there, but Gaea grieving for her children gave one of them, Chronos (Time), a sickle of adamant and instructed him how he might wound his father. He did so, and released the Titans, who married their sisters, and from them sprang a numerous family of gods. Chronos then took the place of his father on the throne of the gods and married his sister, Rhea. Their children were: Pluto, Poseidon, Zeus, Hestia, Demeter, and Hera.

The parents of Chronos had said he was to be dethroned

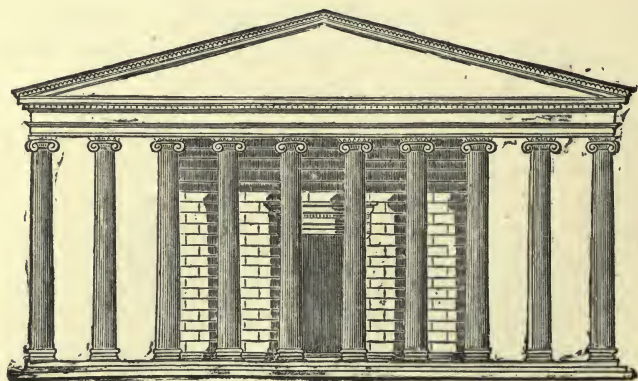


FIG. 151.—FRONT OF GREEK TEMPLE.

by his youngest son. Chronos, to prevent this, swallowed his children as fast as they were born. When the sixth, which was Zeus, was born, his mother saved him by giving the father a stone to swallow instead of the child. Zeus was concealed in a cave and fed with the milk of a goat and honey. When he grew up he persuaded his father to yield up the sons he had swallowed. These sons joined together and drove their father from the throne and made Zeus king in his place. The other Titans, however, did not like this, and made war upon Zeus. After a long and

fierce struggle Zeus came out victorious, and from that time became the supreme ruler and "father of gods and men." Thus was produced the third generation of gods. They dwelt upon Mount Olympus, an elevation in Greece, about a mile and a half in height. The principal, or Olympian gods, were twelve in number, five above mentioned as the children of Chronos, and six who were children of Zeus: Apollo, Artemis, Hephaestos, Ares, Hermes and Athene, the twelfth being Aphrodite, daughter of Uranos and the ocean. This third stage of the religious develop-

ment represents a distinctive human character of the gods. Since the Romans worshiped the same gods as the Greeks under different names, a further description of them will be deferred until we come to a discussion of the religion of the Romans. A few words in regard to the character of the Greek religion and the mode of worship will, however, be demanded here.

Religion was not an important feature in Greek civilization. In this respect they differed from many other nations of antiquity.



FIG. 152.—HERMES (MERCURY) MESSENGER OF THE GODS.

Their religion was noted for its human character. Their gods were simply ideal men and women. Unlike the Hebrews, their gods were formed in the image of men, and not men in the image of God. Their gods were not far away, and often, as they believed, mingled in disguise among men. Homer represents the gods of Olympus, as making love to each other, feasting, drinking wine, holding discussions, quarreling and fighting, and making up

again, just like men. Their religion did not have a man for a founder, but was simply a natural growth from a simple nature worship, which, perhaps, was first mere fetichism. They had gods for every department of industry, and every phase of thought; that is, their feelings and actions were personified, and the personifications took characters which were intensely human in nature.

The earlier Greeks doubtless brought their religion with them from the land of their origin; as language proves that the Greeks are a branch of the Aryan stock, which had its origin in Asia, their religion must have been at first that of their Aryan ancestors. The fact that the first generation of Greek gods were personifications of the powers of nature connects them with the people who followed the religious teachings of the earlier Vedas. The reader will remember that the gods of the earlier Vedas were personified forces of nature, and that the language of these sacred books, the Sanskrit, is only another branch of the great Aryan family of languages. But in course of time the gods change, as we have seen, to that of a human character. The Greeks had also what have been termed demi-gods, or deified men. When a great warrior, or benefactor of mankind died, he went to heaven and became a god. These men, however, were not worshiped as gods for a long time after their deaths, or until the stories told about them had grown into relations of miraculous doings and marvelous actions. Thus Hercules was a man of reputed great strength, and many wonderful stories are told of him, and he was afterward worshiped as a god. Esculapius was a great physician, and in time was worshiped as one of the gods. In this we have a resemblance to the worship of ancestors, as practiced by the Chinese at the present day.

While their gods were to a great degree human in their

nature, they were still representatives of certain powers of nature. Thus, Hera, the wife of Zeus, was the representative of the female power of the heavens, or "the atmosphere, with its fickle and yet fertilizing properties," and Zeus was the representative of thunder and lightning, or the chief power of the heavens. To the Greek every tree had its god, and every stream and mountain its spiritual representative.

The worship of the Greeks consisted in prayers and sacrifices and public festivals. When they gained a victory over their enemies, or had a plentiful harvest, they offered sacrifices to show their gratitude. When they wished to engage in any great enterprise or avert the anger of a god, they offered prayer and sacrifice. They had no priestly caste like many other ancient religions, and, therefore, no dangerous priestcraft; but they had numerous soothsayers or diviners, who were frequently consulted on public affairs, and were often bribed by designing and ambitious politicians.

The Greeks were a highly cultured people, and Christianity as preached among them by St. Paul and others made rapid development. This culture no doubt prepared the way in a certain degree for the Christian religion.

The gods of the Greeks as they appear in sculpture are beautiful beings in the forms of men and women, with perfect bodies. As they appear in poetry and romance they are exaggerated human beings, loving and hating intensely, not moral, but fascinating in the sense of being interesting. They were not vast abstractions, nor were they represented in worship as hideous idols like the gods of India.

The study of theology among the Greeks had a tendency to cultivate a love for the beautiful, and this is a

step toward a higher life. This idea had also a tendency to prepare the way for the introduction of Christianity.

THE RELIGION OF THE ROMANS.

While it may be said of the Greeks that their religion was a worship of the spirit of beauty in nature, it may be said of the Romans, that theirs was a worship of power and law. The Romans borrowed their gods from the Greeks, but they did not regard them in the same light. The Greeks were poetic in their religion, the Romans prosaic and practical. Everything in Rome must tend toward the aggrandizement of the Roman State. Their religion was subordinate to their patriotism. It was made use of to further the ambitious spirit of the Roman government. Their chief god made it his sole business to attend to the interests of Rome.

Like the Greeks, their gods were numerous. They had a god for almost every idea. Their religion was the most polytheistic of all religions. They had a divinity who presided over beginnings, and another over endings, one for talkativeness, another for silence, one presiding over home, one for the fields, one for the woods, another for fountains. They had gods of wine and carousals, gods of battle, and gods of peace, one who presided over births, and another over deaths. They even had a goddess whose duty it was to preside over doing nothing. Whenever a new article was introduced, or a new kind of business, a new god had to be invented. Thus, when cattle (*Pecus*) came to be used for money, they invented *Pecunia*, goddess of money. From this we get our word pecuniary. When copper was introduced into the arts in Rome, they made the god *Esculanus* to preside over copper, and when silver money was invented, they invented the god *Argentarius*, or the god of silver money.

The twelve Olympian gods of the Greeks became gods of the Romans, and were worshiped under different names. In the following sketch of a few of the gods, I have given the Roman name, with the Greek name corresponding to it, in brackets.

Jupiter [Zeus], the chief god, or ruler of the gods, derives his name from the ancient Sanskrit root. Div or Diu, meaning light, or splendor of heaven, or of day,

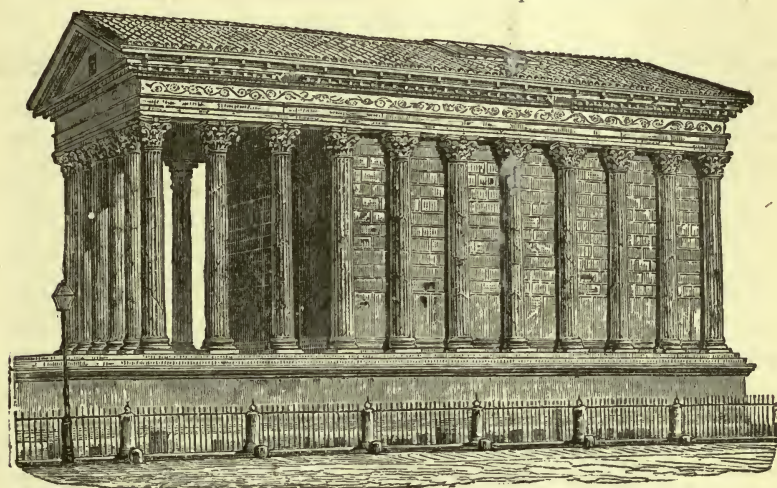


FIG 153.—ROMAN TEMPLE AT NISMES, FRANCE.

coupled with the Latin word *pater*, father; hence *Diu-pater*, *Jovis-pater*, and *Jupiter*, and sometimes simply *Jove*. It is the same as the Greek *Zeus*, which means about the same as the Sanskrit, *Div*, or *Diu*, that is, *light*. The word *Jupiter* then, would mean *Father of Light*, and the Greek *Zeus*, and the Roman *Jupiter* or *Jove*, are one and the same god, under different names, and slightly different attributes. The Romans had many temples erected to *Jupiter*.

Juno [*Hera*] was the wife of *Jupiter*. She is de-

scribed as being proud, jealous and scornful. She was attended by the Charities [Graces], and the Horæ [Seasons] during times of peace. Iris, the goddess of the rainbow, was her constant attendant.

Neptune [Poseidon] was the god of the sea. He is often represented as driving a chariot with horses over the water, and bearing in his hand a trident, or three-pointed spear.

Venus [Aphrodite] was the goddess of female beauty, and of love. She is said by some to have been the daughter of Jupiter and Dione, by others to have sprung from the foam of the sea. Her son and constant companion was Cupid [Eros] who was armed with a bow and arrows, and shot darts of desire into the hearts of men and gods.

Vulcan [Hephæstos] was the god of fire. He was the son of Jupiter and Juno, and being the cause of a quarrel between his parents, Jupiter seized him by the heels and threw him out of heaven. He was a whole day falling, and in the evening reached the Island of Lemnos, where a volcano exists. He is represented as a blacksmith working at his forge. When the Greeks and Romans beheld the smoke and fire from a volcano, they thought Vulcan was in the mountain forging thunderbolts for Jupiter to hurl at the earth, and the smoke was from his forge. They said Jupiter gave Vulcan Venus for a wife, as a compensation for his service in forging these thunderbolts.

Mars [Ares] was the god of war. Our word *martial* comes from this name. In Athens was erected a court of justice, on a hill which was called from the Greek Ares, Areopagus, or "Mars Hill." It was here where Paul stood, when he delivered his celebrated speech to the "Men of Athens." (See Acts XVII., 22-31).

Mercury [Hermes] was the messenger and interpreter of the gods. (See fig. 152). Quicksilver is called mercury from its readiness to move about, in allusion to the active nature of this god.

Minerva [Pallas] was the goddess of wisdom. The owl was taken as her symbol. Apollo was the god of music, archery, prophecy and medicine. Under the name of Helios, he is also god of the sun, and his sister Diana, goddess of the moon, under the name Luna [Selene]

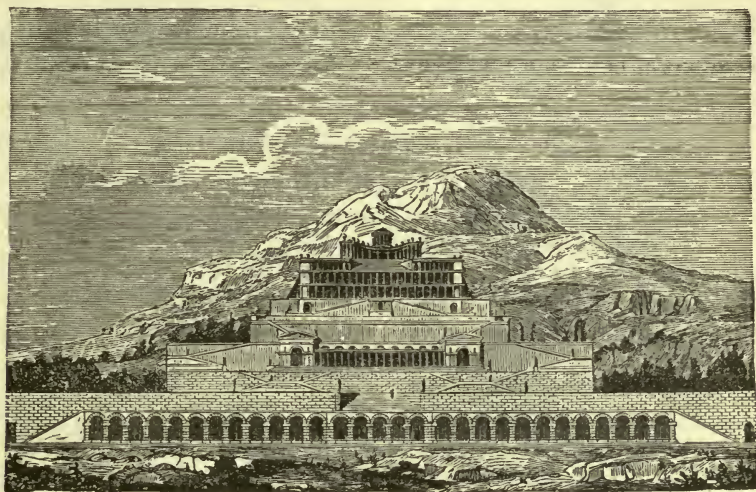


FIG. 154.—THE ROMAN TEMPLE OF FORTUNE AT PRÆNESTE.

Reference is made in Acts XIX., 34, 35, to the worship of Diana at Ephesus.

Ceres [Demeter] was the goddess of fruits and vegetables, and the originator of agriculture. Vesta [Hestia] her sister, was goddess of the home and fireside. There was in Rome a temple erected in honor of Vesta, in which was a fire which was never allowed to go out. This temple contained a small image of Minerva [Pallas], which they said originally fell from heaven into the city

of Troy, and upon the capture of this city, was carried to Greece, and from thence to Rome. This image was called the Palladium, and upon its preservation the safety and existence, as they believed, of the Roman empire depended. In allusion to this fact, is the saying, "The right of trial by jury is the *Palladium* of civil liberty."

Janus was a god, held in great reverence by the Romans. In fact, his rank was almost equal to that of



FIG. 155.—JANUS.

Jupiter, and in some things he held the first place. It was thought that he particularly presided over the military enterprises of Rome. Hence the great gates of his temple in the heart of the city were left open, so that the people might always offer sacrifices for the success of the Roman arms. These gates were closed during the

reign of Augustus, for the first time *in eight hundred years*, for Rome was at peace with all the world. Janus was represented with two faces, one looking into the future, the other noting the past.

There were many other gods, goddesses, and fabulous beings, which might be described here, did space permit. The reader will find a full account of them in any work on mythology. A study of this subject is almost a necessity, if one would understand thoroughly the writings of many of the great poets and novelists, since the allusions to them are frequent in all literature.

The worship of the Romans was very extensive, applying to all the affairs of daily life. Their year was full of festivals of a religious nature. Prayers, sacrifices, and divinations, or attempts to ascertain the will of the gods, were the principal part of their worship.

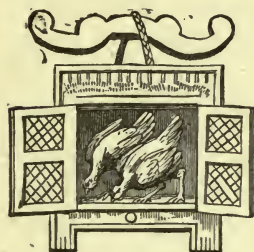


FIG. 156.—CHICKENS FOR AUGURY.

In the engraving the cage of the sacred chickens is shown. These birds were consulted on great occasions by feeding. If they ate it was a favorable omen. During the Punic wars a general, enraged because they would not eat, ordered them to be thrown overboard, saying, "Let them drink." He then won the battle.

The Roman Catholic Church, which was built upon the ruins of the Roman structure, retains to-day much of the manner and form of the Roman worship.

The leading idea of the Roman religion was a respect for law, and this was the leading idea of the Papal Church. The Pope was the giver of the law, and all must obey his edicts. Christianity has added to the Roman idea of obedience to law, an idea of love and inspiration, and in this sense has the religion of Rome been a preparation for Christianity.

THE RELIGION OF ZOROASTER.

Zoroaster was the founder, or at least the great prophet, of the religion of the ancient Persians. Little is known of his life, or of the time in which he lived. Some have made him cotemporary with Abraham, others with Moses, the dates assigned by different scholars varying from 1,000 to more than 2,000 years before Christ.

Zoroaster and the religion of the ancient Persians, are spoken of by Plutarch, Herodotus, and other ancient

Greek writers. Herodotus says, "The Persians have no altars, no temples, nor images; they worship on the tops of the mountains. They adore the heavens, and sacrifice to the sun, moon, earth, fire, water and winds."

Plutarch, speaking of this religion, says, "Some believe that there are two Gods,—as it were two rival workmen, the one whereof they make to be the maker of good things, and the other bad. And some call the better of these God, and the other Dæmon; as doth Zoroastres, the Magee, whom they report to be five thousand years older than the Trojan times. Thus Zoroastres, therefore, called one of these Oromazes, and the other Arimanius; and affirmed, moreover, that the one of them did, of anything sensible, the most resemble light, and the other darkness and ignorance; but that Mithras was in the middle betwixt them. For which cause the Persians call Mithras the mediator. And they tell us that he first taught mankind to make vows and offerings of thanksgiving to the one, and to offer averting and feral sacrifice to the other. For they beat a certain plant called homomy in a mortar, and call upon Pluto and the dark; and then mix it with the blood of a sacrificed wolf, and convey it to a certain place where the sun never shines, and there cast it away. * * * They say that Oromazes, springing from purest light, and Arimanius, on the other hand, from pitchy darkness, these two are therefore at war with each other. And that Oromazes made six gods, whereof the first was the author of benevolence, the second of truth, the third of justice, and the rest, one of wisdom, one of wealth, and a third, of that pleasure which accrues from good actions; and that Arimanius likewise made the like number of contrary operations to confront them."

Our knowledge of this religion comes partly from the

accounts of these Greek writers, partly from a collection of ancient writings known as the *Zend-Avesta*, and partly from a remnant of the ancient religion existing to-day in Persia, and in India, and practiced by the Parsees, or Parsis.

The *Zend-Avesta* was translated in the eighteenth century, by a young Frenchman named Du Perron, he having learned the language in which it was written from the Parsees. These writings consist mainly of hymns, prayers, and thanksgivings. The prayers are to a multitude of gods, among whom Ormuzd is the supreme.

The leading idea in this religion was the belief in two great principles, one of good, the other of evil. Zoroaster taught that the good would finally predominate over the evil. He taught a system of morality, based upon the idea of seeking after the good, and fighting the evil.

He represented the good and evil spirits as striving against each other, and called upon men to enlist in the fight for the good against the evil.

The theory of these people concerning the creation of the

world has been given in the first chapter of this volume.

The modern Parsees, also called Guebres and fire-worshippers, are found chiefly in India. The number in the city of Bombay is estimated at 100,000. They are a good, moral, industrious people, and some of them are wealthy and generous.

During our late Rebellion, the Parsees sent aid to the Sanitary Commission, and except George Peabody, no



FIG. 157 — MONSTERS SUPPOSED TO BE EVIL SPIRITS, FROM GEMS AND CYLINDERS (PERSIA.)

man has donated so much for charitable purposes as one of their number, Sir Jamsetjee Jeejeeboy, whose contributions amounted to a million and a half of dollars.

It is thought that the "wise men" who visited Christ when an infant at Bethlehem, were priests of the religion of Zoroaster, and some even go so far as to say that the Hebrews received their ideas of a devil and a hell from this people.

THE RELIGION OF THE ANCIENT EGYPTIANS.

Not only do we have preserved in the paintings and hieroglyphics, and in the imperishable stone monuments and structures themselves, a description of the daily habits,

the condition of the arts, and the political opinions of the inhabitants of the Nile Valley as they lived more than forty centuries ago, but we have also a rather complete knowledge of the religious faith and the modes of worship of this wonderful people. We have, moreover, in addition to the testimony of the discovered remains, frequent allusions to the religion of the Egyptians, in the writings of the ancient Greeks. From the number of the sacred symbols among their remains, as well as from the statements of Greek writers, we know that the Egyptians were an eminently religious people. Herodotus says:



FIG. 153.—THE EGYPTIAN GOD AMMON.

"They are of all men the most excessively attentive to the worship of the gods." Wilkinson, the great student of Egyptology, says: "The Egyptians were unquestionably the most pious

nation of all antiquity. The oldest monuments show their belief in a future life." Their religion was like most of the ancient religions, a polytheism. Their gods were numerous. Every month and every day was sacred to some god. They had more religious festivals than any other people. Their temples were numerous, and each had its own body of priests. The priests were not an exclusive caste like the Brahmins, but were continued in families. They were the scholars and scientific men, and were exempt from taxation. They were very particular in their diet. Swine's flesh and fish were not eaten by the priests. Animals were sacrificed, and prayers offered for the dead. Flowers, fruits, jewelry and wine were also offered as sacrifices. Processions were a common thing among them.

Their religion was of a gloomy nature. A Greek writer says: "The gods of Egypt rejoice in lamentations, those of Greece in dances."

They believed in the doctrine of transmigration of souls, but it differed from that of the Hindoos. The latter held that the soul must pass through the bodies of various animals as a punishment, but the Egyptian idea had nothing of this in it. They believed that the soul must pass through all species of animals, beasts, birds, fishes, insects,



FIG. 159.—EGYPTIAN PROPHET,
WEARING THE LEOPARD SKIN,
(THERES).

and so on, until it had completed the entire round of animal existence, and then it would again enter into the body of man. They thought that it would return to man in 3,000 years, but it does not begin to migrate until the decay of the body. This is thought to be the reason for their

embalming the body, for if they could take off a part of the time by keeping the soul with the body, the time engaged in passing through the lower animals would be shortened.

A peculiarity of their religion was animal worship. There were more than a hundred species of animals which were regarded as sacred, and it was unlawful to kill any of these species. A particular object of veneration was Apis, the sacred bull. This animal represented Osiris, one of the manifestations of the Deity. The bull was kept at Memphis in a magnificent temple. He had black hair, and a white spot in his forehead. When he died his body was embalmed and buried with great pomp, and public mourning followed. The priests then searched for another bull with the proper marks, and brought him to Memphis to become a new *Apis*. Only a few years ago the burial



FIG. 160.—THE SACRED BULL APIS.

place of the sacred bulls was discovered. It was an arched gallery hewn out of the solid rock to the extent of 2,000 feet, and contained a number of sarcophagi, or stone coffins, each fifteen feet long by eight feet wide. The animals which were sacred in one locality were not so in another, and this often led to serious trouble and even civil

war. The worship of the principal deities, too, was more or less local. For example, in one district Ammon was the supreme god; in another, Thoth, or Hathor, and so on, through a long list. *Osiris* was, perhaps, the only deity whose worship existed all over Egypt.

That the religion of the ancient Egyptians had its influence upon the religion of other countries, and of later

times there is no doubt. Some of the ceremonies of the old Hebrew worship were probably derived from the Egyptian through Moses. The rite of circumcision is supposed to have come into the Hebrew religion from the Egyptians, who received it from the African natives. Livingstone found the custom prevalent among certain African tribes. Says James Freeman Clarke, "Those who regard this rite as instituted by a Divine command may still believe that it already existed among the Jews, just as baptism existed among them before Jesus commanded his disciples to baptize."

Many of the customs of the Christian Church have been claimed as originating among the Egyptians. Among



FIG. 161.—THREE FORMS OF OSIRIS.

them may be mentioned the custom of putting a ring on the bride's finger. This was done by the Egyptians as a token that the husband intrusted his wife with all of his property. The Catholic priest shaved his head just as

the Egyptian priest did, and the pope's infallibility was anticipated by the Egyptian priest of Thebes, who claimed the title of "Keeper of the two doors of heaven." The Greeks borrowed ideas in religion from the Egyptians, just as the Romans borrowed from the Greeks.

RELIGION OF THE NORSEMEN.

The people who anciently inhabited Scandinavia, or the peninsula of Norway and Sweden, were called Norsemen, or Northmen. When we speak of the Norse mythology, or the religion of the Norsemen, we mean to include also the religion of the Teutons, Saxons and other peoples of Northern Europe. What we know of the religious ideas and worship of these people comes to us by tradition. It seems that these northern nations were noted for their songs and ballads, which were composed and sung or recited by persons called *skalds*, or *bards*, and memorized and handed down from fathers to sons until about the eleventh century a Christian priest, Sigmund Sigfusson, of Iceland, first collected and committed them to writing. This collection was called the elder, or poetic edda. The word edda means great-grandmother, and was, perhaps, given to these songs because the grandmothers and great-grandmothers recited them to their grand-children and great-grand-children. These poems describe the gods, and give an account of creation; also contain legends, or stories of the heroes of Scandinavian history, and proverbs, or wise sayings concerning human life and manners.

The younger, or prose edda, was produced during the next century by a native of Iceland. He probably wrote the most of it from the elder edda and added other traditions gathered from the people. From these works we get a knowledge of the religion of the Scandinavians.

Their account of creation has already been given (page 20). The Eddas describes twelve principal gods. The gods met in daily council beneath the tree yggdrasil. Odin, or Wodin, was the principal god, or "All father," and in this respect is analogous to Zeus, or Jupiter of the Greek and Roman religion. Odin possesses a wonderful horse, Sleipnir, with eight legs, on which he rides over land and sea. His spear, Gungnir, never failed to strike what it was aimed at. Odin has two ravens, Hugin (reflection), and Munin (Memory), which he sends over the world to gather intelligence.* Two wolves, Gere and Freke (the greedy and the voracious), were his constant companions and ate at his table. Odin's ring, Draupner, which symbolized fertility, brought forth another ring of its own size and value every ninth day. Frigga was the wife of Odin. From these two names we get our words Wednesday (Woden's day), and Friday (Frigga's day). Thor, or Donar ("The Thunderer"), was the oldest son of Woden. He is represented as holding a hammer and driving through the clouds in a car drawn by two goats. The Norsemen regarded Thor's hammer with as much reverence as Christians do the cross. From Thor we get our word Thursday (Thor's day). Many very interesting things are told in the Eddas about Thor and the other gods.

VALHALLA.

Valhalla is the happy place where all who die in battle go and spend their time in feasting and fighting. Here,

* In the elder Edda Odin is made to say of his ravens, they:

"Fly each day
Over the spacious earth;
I fear for Hugin,
That he come not back,
Yet more anxious am I for Munin."

however, their wounds received in battle, no matter how great, are healed as soon as feasting begins. They feast on the flesh of a great boar, which, being cooked every morning, grows whole again at night.

The gods of the Norsemen were somewhat similar to those of the ancient Vedas and the Greeks and Romans, that is, impersonations of the powers of nature. In some



FIG. 162.—ODIN, THE "ALL-FATHER."

respects their religion resembled that of Zoroaster. The gods are represented as contending, the good ones against the bad, and the final result is to be a new order of things, a triumph of the good over the evil.

Their gods were in some respects characteristic of the surroundings of the people. Dwelling midst ice and snow a

large part of the year, and, seeing for a season the warmth of the sun melt the ice and bring out the plants and make all nature rejoice, it is not strange that they should represent their gods as battling with each other, as heat with cold, sunshine with storm, fire with water. The people, too, were fighters like their gods. War was their principal business, and their life a constant conflict with the powers of nature.

The ceremonial worship of these people was simple, at first in the open air, but later in temples. They had festivals in honor of the sun, and of the earth. They offered the flesh of animals, fruits, and occasionally and in later times human beings as sacrifices. They had their soothsayers and

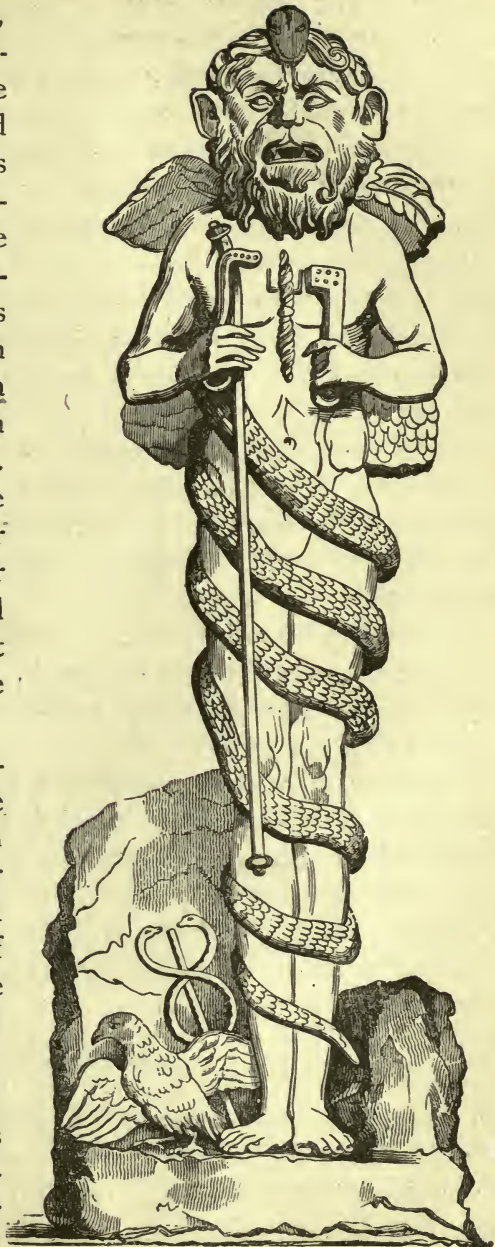


FIG. 163.—A SCANDINAVIAN GOD.

priests. The *Runes* were certain letters or characters which the ancient Norsemen carved on rocks. These were considered as having magical powers. They believed that by them the dead could be made to speak.

We may ask what did this religion contribute toward Christianity? It will not be wrong to reply that as a sense of honor and truth naturally go with the quality of bravery, and that as ice and snow are symbols of purity and chastity, these northern people when they became civilized and adopted the Christian faith, endowed their worship with the qualities of a strong love of truth, honor, and purity.

The fact that the founder of Protestantism was a Saxon, is a significant one. Luther was a fighter, and his warfare, though a spiritual one, owed its energy and success to the stock of physical fighters from whence he sprang.

After the introduction of Christianity, honor was still in some cases paid to the old gods, and as the idea of an evil spirit had been taught by the Christians, the Norse gods, Loki, the god of fire; and Thor (Donar) the god of thunder, were confounded with the Christian idea of a personal devil, and sacrifices of horses, he-goats, and hounds were made to them. In Germany they have to-day a saying when they hear thunder, "The devil must be striking," and perhaps the expression we sometimes hear: "Go to thunder," is only another way of saying, "Go to the devil."

DRUIDISM.

When the Romans invaded Gaul (ancient France) and Britain, they found the Keltic nations which inhabited these countries practicing a religion differing from that of the Norsemen. The priests of this religion were called

Druids. We know very little of these people except what has been recorded by Julius Cæsar, the Roman invader. They derived their name from the custom of worshipping in oak groves. The Druids were, it seems, not only the teachers of religion but the law-givers, physicians, and instructors of the people generally. According to Cæsar, "They hold a great many discourses about the stars and their motion, about the size of the world, and of various countries; about the nature of things; about the power and might of the immortal gods; and they instruct the youth in these subjects."

Some of their religious rites were cruel and revolting. Public sacrifices of human beings were made to propitiate the gods. A gigantic cage of wicker work in the form of a human body was constructed, filled with living men and set on fire, the unfortunate victims perishing in the flames.

They believed in the doctrine of the transmigration of the soul, and regarded the future life as a repetition of the present.

Many authors speak of the dolmens, cromlechs, and other monuments found so abundantly in England and France, as remains of Druidical temples, but as stated in a former chapter, the highest authorities of the present day do not regard them as such, but as tombs of prehistoric races. (See Chapter V in Book I.)

THE RELIGION OF THE ANCIENT PERUVIANS AND MEXICANS.

Peru is to-day in the third great era, or stage of civilization. The present stage dates from the invasion of the Spaniards in the sixteenth century. Before that the country was ruled by a people known as the Incas. We know very little of these people. A few traditions which are contradictory and incomplete, is all the history we have.

The word Inca means in their language, "The sun." They say the first Inca appeared on the shores of Lake Titicaca with his wife, and declared he and his wife were children of the sun, and were sent by that luminary to instruct the people. After teaching them agriculture and the arts, and giving them a system of government and religion, he returned to the sun. All that can be said of these people, then, is that they were sun worshipers.

But the remains of temples of which there are no traditional accounts, shows the existence of a people who flourished before the Incas. As no images are found it is inferred that they had a pure Theism, the worship of a supreme and invisible God.

Little can be said regarding the religion of the ancient inhabitants of Mexico. The Toltecs who preceded the Aztecs had a mild form of religion which they bequeathed to their successors. They believed in one supreme being, creator of the universe, named Taotl, under whom were numerous inferior deities. The Aztecs introduced human sacrifices. The victims were, amidst the greatest pomp and ceremony, laid bound upon public altars where the priests tore out their hearts, which were then cut up in small pieces, mixed with maize, and eaten by the worshipers. Disgusting scenes of cannibalism followed and numerous were the victims. With these revolting practices were the milder worship of offering flowers, fruits, and perfumes. They had a tradition that Taotl, their god, had left the earth promising to return; when the Spaniards came with their white faces and long beards, they regarded them as in some way connected with their lost divinity.

They had a numerous and powerful priesthood, and many magnificent temples. Cortez, the Spanish invader, found as many as 5,000 priests officiating in the temple of the city of Mexico. (See Chapter V Book I.)

THE RELIGION OF THE ASSYRIANS AND BABYLONIANS.

The two great nations of antiquity, Assyria and Babylonia, were so nearly alike in their history and religion that they may be treated as one nation. The earliest religion known among these people was a species of Sha-

manism, similar to that of the tribes of Siberia to-day. Each object, whether animate or inanimate, had its spirit, good or bad, and the priests and sorcerers were supposed to have the power of controlling them. Demons, or bad spirits, were especially numerous. Diseases, and all other evils which might afflict humanity, were thought to be caused by evil spirits.

In time, certain powers of nature were deified, or elevated above the rest, and became the principal gods.



FIG. 164.—THE HAWK-HEADED GENIUS. ASSYRIAN DEITY (KHORSABAD.)

At the head of these powers of nature stood the trinity, consisting of Na or Auna, "The sky;" Ea, "The earth;" and Mulge, "the Lord of the under world." Subordinate to these were a vast multitude of gods." At a later stage the trinity took the names of Anu, Ea, and Bel, all children of Zicu, "The sky;" and below these four supreme beings came another trinity consisting of the Moon-god, the Sun-god and the Air-god, making the "seven magnificent deities." Subordinate to these were "fifty great gods," and three hundred spirits of heaven, with six hundred spirits of earth. The most terrible of the spirits of earth



FIG. 165.—ASSYRIAN WORSHIPER BRINGING AN OFFERING.

were known as "The seven spirits," who were born without father or mother, in the abyss of the ocean. They carried plagues and evils over the earth.

Temples of worship and priests were very numerous. Sacrifices were offered to the gods, as was the custom with other Semitic nations. Each village or town had its own

particular god, and some of the deities had many names, and some of them as many as fifty titles besides. The deities are represented as male and female, each god being associated with a goddess.

Nin, the fish god, was one of the principal Chaldean deities. He was also called *Bar* or *Bar-shem*. In Assyria his emblem was the winged man-bull. He is the god of strength and courage, and by some is identified with the Greek Hercules. In the inscriptions he is called "Lord of the Brave," "The Champion," "The Warrior who Subdues Foes," "He who Strengthens the Heart of His Followers," "The Destroyer of Enemies,"



FIG. 166.—NIN, THE FISH GOD.

etc. He is also called, "The First of the Gods." He was the son of Bel-Nimrod. Beltis was both his mother and his wife.

The hawk-headed genius (fig. 164,) is supposed to be a good spirit or genius. In his hand is the sacred basket common in Assyrian and Chaldean sculptures. Its significance is not known.

CHAPTER X.

MYTHS AND FOLK LORE.

THE WILLIAM TELL MYTH.

The majority of my readers have heard of William Tell, the hero of Switzerland, and many perhaps, have always regarded the story as true history. But, notwithstanding the story is believed almost universally by the people of Switzerland, and in fact, by people everywhere, and the fact that the present inhabitants of that country will point out to the traveler the spots made memorable by Tell's exploits, and even show them his cross-bow in the arsenal at Zurich, the story is but a myth, as unreal as the adventures described in the Arabian Nights.

The story is almost too well-known to need repeating here, but there may be some who are not familiar with it. In the year 1307 one Gesler, a tyrannical governor of a province of Switzerland, in order to test the submission of his subjects, placed a cap on a pole, and gave out orders that every one who passed by, should bow down to it. A brave mountaineer named William Tell, having heard of it, boldly passed by without making the salute. He was at once arrested, and brought before Gesler, who, having learned that Tell was an expert with the bow, ordered him to shoot at an apple placed upon the head of his child. The father hit the apple, and the child was unharmed, but Gesler observed that Tell had concealed an

arrow under his garment, and he inquired the reason. "To slay thee, tyrant, had I killed my child," was the prompt reply. This incident was made the subject of a very popular drama, written by Schiller, the great German poet.

Now, what is singular enough, this same story, with some modifications, exists among many different nations. Thus, a Danish writer tells the same story of a hero of his own country who lived two hundred years before the Swiss William Tell, the only difference being that the hero had boasted of his skill in shooting, and had said that he could hit the smallest apple on the top of a stick, at a considerable distance, and the monarch to punish him for boasting, ordered him to shoot an apple from his son's head.

The Norwegians have a similar story of one of their heroes. It also exists among the Finns, and among the Persians. There are always minor differences. Sometimes the object is a nut, or a coin, instead of an apple, but the essential parts of the story are the same.

There is always a skillful archer who, at the command of a tyrant, shoots a small object from the head of his own son, and the archer always provides himself with a second arrow, with which he intends to kill the tyrant had he failed of his mark.

In explanation of these facts, S. Baring-Gould says: "The coincidence of finding so many versions of the same story, scattered through countries as remote as Persia and Iceland, Switzerland and Denmark, proves, I think, that it can in no way be regarded as history, but is rather one of the numerous household myths common to the whole stock of Aryan nations," and he conjectures that some time an early East Indian legend may be found, which will correspond so closely to these known,

that it may be taken as the original from which all the others sprang.

John Fiske says: "When a marvelous occurrence is said to have happened everywhere, we may feel sure that it never happened anywhere. Popular fancies propagate themselves indefinitely, but historical events, especially the striking and dramatic ones, are rarely repeated. The facts lead to the conclusion, that the Tell myth was known, in its general features, to our Aryan ancestors, before ever they left their primitive dwelling-place in Central Asia."

The first writer of any note who expressed doubt of the story of William Tell, was Guillimann, in a work on Swiss Antiquities in 1598. He calls the story a fable, but yet declares his belief in it, because the tale is so popular. In 1760 Uriel Freudenberger was condemned to be burnt alive in Switzerland, for proclaiming his opinion that the story of Tell originated in Denmark.

The legend of William Tell may be taken as an example of a large number of popular household myths, or stories which have been handed down from generation to generation, some of them taking a place in the histories of the country, and until recent years, believed almost universally as having been actual occurrences.

THE DOG, GELLERT.

Among these stories, one of the most touching is that of the Welsh Prince Llewellyn and his noble dog, Gellert.

This dog was intrusted with the care of the infant son of the Prince during his absence. When the Prince returned, he beheld the cradle empty, the clothes dabbled with blood, and blood upon the dog. Concluding that the dog had devoured his child, he drew his sword and killed the brute. No sooner had he done this, than he

heard the cry of the babe behind the cradle, and on looking, beheld his child uninjured, and saw at the same time, the dead body of a huge wolf which had entered the house to devour the child, but had been killed by the faithful dog. The Prince in sorrow erected a monument to the dog, and called the place after his name.

Now this story, under slightly different forms, appears in almost every Aryan nation, also among the Arabians, the Chinese, and other Eastern people. Sometimes the faithful defender is a cat, sometimes a weasel, or a falcon, or some other animal, the essential features of the story being as follows: A man forms a friendship for some dumb creature. The animal renders him an important service. The man misunderstands the act, and in haste destroys his faithful friend.

I have given accounts of these stories, merely as interesting facts, yet they have their place in proving the unity of the human species. The fact that the story of William Tell is common to nearly all the Aryan nations, is an evidence of their common origin. The great similarity in the versions of the story show that in the earliest stages of these nations they were one people, and had common ideas and practices. But there are other stories which are not confined to the Aryan nations. The nursery story of "Jack and the Bean Stalk" is found not only among Aryan peoples, but among the North American Indians and the Zulus of Africa. This fact seems to me to prove that mankind is everywhere alike, and though it may have been very far remote, there was a time when there was not only far less divergence than now, but a sufficient similarity to entitle them to be called one race. Do not these facts seem to make good the poet's words:

" The human race,
Of every tongue, of every place,

Caucasian, Coptic, or Malay,
All that inhabit this great earth,
Whatever be their rank or worth,
Are kindred and allied by birth,
And made of the same clay."

The reader has doubtless observed with what readiness a good story will travel over the country, and different persons in different parts of the country be made its heroes. This is especially true if there is a good joke connected with it. There is always a noted story-teller in every community, and there are always those ready to listen to him. He knows that a story is more effective if real characters are made the actors in it; hence he tells the circumstance as having occurred at a certain place and certain parties as being the actors, and any embellishments which may add to its effectiveness he will not fail to insert. This fact seems to me to throw light upon the origin and propagation of such stories as the preceding.

THE WANDERING JEW.

Among the legends which are not only interesting in themselves but illustrate the credulity and simplicity of the people of past times, may be mentioned the story of the Wandering Jew. There are several versions of the story, but according to one account there lived in Jerusalem during the time of Christ, a shoemaker, who, on account of his treatment of Jesus, was not permitted to die, but condemned to wander upon the earth until Christ's second coming. As Jesus was bearing His cross he passed by the house of this man, and sinking under the weight, asked permission to rest the cross upon a stone in front of the house. The shoemaker drove him on with curses. Jesus turned upon him and said: "I am going, but you shall tarry until I return." This man is reputed

to have been seen a number of times in various parts of Europe. It is believed that he was thirty years old at the time of Christ's crucifixion, and that at the end of every hundred years he falls into a trance from which he awakes with the same vigor which he had at the age of thirty. The belief in this legend was almost universal in the sixteenth and seventeenth centuries. The French novelist, Eugene Sue, has written a romance based upon this legend, and Dr. Croly in his novel, "Salathiel," also makes use of the story. Gustave Dore, the great French artist, has produced a series of pictures illustrative of the same. Southey, in his poem, "The Curse of Kelama," traces the course of the Wandering Jew, who was a fair type of the wanderings and miseries of his race for ages.

PRESTER JOHN.

During the twelfth century there was a report started in Europe that there reigned in Asia a great Christian emperor, named Presbyter Johannes, or Prester John. It was said that he had conquered the Mohammedans in that part of the world, and was ready to come to the assistance of the Crusaders, who were then attempting to rescue the Holy Land from the Mohammedan Turks. This report was widely believed, and caused great rejoicing among the people throughout Europe. Pope Alexander III. addressed a letter to this personage and entrusted it with his physician, who set out to deliver it, but never returned. Marco Polo and some other early travelers in trying to overthrow the belief in Prester John, unwittingly turned the direction of the popular credulity in another direction. They pictured in such glowing colors the condition of Abyssinia that the people began to believe that this great monarch and his kingdom existed in Africa. The discovery of the Cape of Good Hope in fact was due to this

belief, as exploring parties were sent out to verify the reports.

ANTICHRIST.

From the earliest ages of the Christian Church up to within comparatively recent times, there have been a great many conjectures and some very absurd beliefs concerning the coming of Antichrist. This word is used in the first and second epistles of John, and is generally supposed to mean the spirit of opposition to Christianity, but as to the time of its coming and the form, there has been much speculation. During the Middle Ages the minds of men were wonderfully affected, and many were the peculiar myths concerning the subject.

The most ancient writers thought that when the Messiah should come to establish his kingdom he would meet with a powerful personal antagonist. This was the idea of the Jews, and when Antiochus Epiphanes, the Syrian king, rose and conquered Palestine and attempted to root out the Jewish religion, he was believed to be Antichrist. Again, the early Christians regarded the Jews as Antichrist. Still later, when the Romans began to persecute the Christians, the latter saw Antichrist in the person of Nero and other Roman emperors. After the Reformation it was a prevalent belief among Protestants that Antichrist was the Roman Catholic Church. The Roman Catholics themselves held that pagan Rome was the Antichrist. In the Greek Church, Mohammed was believed to be Antichrist. The Mohammedans themselves believed in the coming of Antichrist. They thought that this power would come in the form of a man mounted upon an ass and followed by 40,000 Jews, and he would devastate the whole world, except Mecca and Medina, and then Christ would descend to earth and in a great battle de-

stroy him. But the most peculiar part of the history of this belief is its connection with the fabulous account of a certain female pope, known as Pope Joan. As the story goes, sometime in the ninth century, a young English girl assumed the character of a man, and having been educated at Cologne, Athens and Rome, obtained admission to the priesthood and was finally elected Pope at Rome, and held this high position over two years before the fraud was detected, which was in the following remarkable manner: She became intimate with one of the cardinals, the final result of which was that she became the mother of a son, whose birth occurred during a public procession. This child was believed by many to be the Antichrist. Some accounts say the father of the child was a servant of the Pope, others that he was the devil himself.

This story of Pope Joan was first circulated 200 years after the date of the supposed Pope, and was generally believed by Protestants in the sixteenth century and later, and Mosheim, the great German church historian, who died in 1755, seemed to think there was a foundation for the story. It is needless to say that the whole story is a fabrication from beginning to end. It illustrates not only the credulity of the people of those times but the unscrupulousness of some ancient historians, for it was related as a fact by the great writers of the Protestant Church of the sixteenth century.

THE SEVEN SLEEPERS.

Another peculiar myth of the early days of Christianity is that of "The Seven Sleepers of Ephesus." They were seven young men of Ephesus who, being persecuted by the Emperor Decius, fled to a cavern. They were pursued, discovered and walled in that they might starve to death; but God caused them to fall asleep, in which state

they were miraculously preserved for nearly 200 years, when they came forth and found Christianity established in Ephesus, and everything wonderfully changed.

This beautiful story seems to have originated in the East. Mohammed inserted it in the Koran with some changes. He makes the sleepers come forth and prophesy his coming, and says they had a dog with them which is to be admitted into paradise.

The myths concerning long sleepers seem to be numerous. Pliny tells the story of Epimenides, who fell asleep in a cave and slept fifty-seven years, and awaking, found everything changed. In the Scandinavian mythology Siegfried is represented as sleeping, awaiting the call to come forth and fight. Charlemagne, the great emperor of Germany and France, was believed to lie sleeping in a mountain waiting his time to come forth and avenge the blood of the saints, and it was believed that the great German ruler, Frederic Barbarossa, sat in a cave at a stone table with his six brave knights, and that when his beard was grown so that it would wind three times around the table, he would awake and rush forth to release Germany from bondage, and place her first among the kingdoms of Europe. In fact, almost every country which has been under a yoke of bondage has its myth of some hero or heroes, who are sleeping in some cave or secluded place, ready sometime in the future to come forth and fight the battles of freedom. Some of the peasants in France believe that Napoleon Bonaparte is sleeping, and will wake up some day to fight again. The story of Rip Van Winkle, familiar to all through the writings of Irving and the personation of Joe Jefferson, had its origin in the old German legend of Peter Klaus, who slept twenty years in the mountains of Germany.

Some have thought that these and similar mythical tales, are simply attempts to represent symbolically some fact in nature, as in the case of the seven sleepers, which they suppose was meant to represent the sleep of the earth during the seven winter months. S. Baring-Gould makes this conjecture because the number seven seems to have something to do with it, as it was said that Frederick changed his position every seven years, and Charlemagne started in his chair at similar intervals, and similar things are told concerning many of the sleepers. It seems to me, however, that we need not resort to this conjecture for explanation. The idea of a person sleeping for a long time and waking up to find things changed, might occur to different persons who would manufacture on that basis interesting stories, and such stories would go the rounds and pass from one generation to another, until they would become fixed beliefs. I venture this as an explanation of the majority of myths which are not obvious attempts at the explanation of natural phenomena.

The stories of Pocahontas saving the life of Captain John Smith, and George Washington and his little hatchet, once generally believed, are now about to be consigned to their proper place among the myths of the past. The former was undoubtedly an invention of Captain Smith, and the latter invented by Weems, the biographer of Washington, to make his book more readable.

TALES OF TAILS.

Among the curious stories believed by our forefathers are the myths concerning tailed men. I have not introduced this subject for the sake of the pun on the words tale and tail, or because it has anything to do with the Darwinian theory, but because it illustrates the credulity of mankind, and their love of the marvelous.

It was commonly believed in some portions of England that the men in certain other counties, or neighborhoods of the same county, had tails. S. Baring-Gould relates that when a boy he was told by his nurse that all Cornishmen had tails, and that he afterward resolved to test the matter by asking a bookseller of his acquaintance, who was a Cornishman, if he really had a tail, and was surprised to receive a negative reply. His nurse, however, satisfied his childish mind by telling him that persons who followed sedentary pursuits sat their tails off, and this was the case with the bookseller.

It was also asserted of the people of Kent that they had tails given to them by divine power as a punishment because they once insulted St. Thomas a' Becket, by cutting off his horse's tail. Lord Monboddo, a Scottish judge of the last century, advocated the theory that man ought to have a tail, that without one he was in that respect inferior to the brute, and asserted that occasionally a child was born with a tail. Dr. Johnson, it is said, held a stout argument with the Scottish lord on this subject, and ended by demanding that the latter should bring him a specimen of a tailed man and he would be convinced.

Most of the early travelers and explorers told stories of tribes of men with tails. Occasionally a modern traveler tells a similar story. In 1852 a traveler in Abyssinia makes this sober statement: "At the distance of fifteen days' journey south of Herrar is a place where all the men have tails, the length of a palm, covered with hair, and situated at the extremity of the spine. The females of that country are very beautiful, and are tailless. I have seen some fifteen of these people at Besberah, and I am positive that the tail is natural." Dr. Wolf, in his "Travels and Adventures," published in 1861, says: "There are men and women in Abyssinia with tails like dogs and horses." This

traveler also says that he was told by Abyssinians and Armenians that "there are in Narea, in Abyssinia, people—men and women—with large tails, with which they are able to knock down a horse; and there are also such people near China." In a note he says: "In the College of Surgeons, at Dublin, may be still seen a human skeleton, with a tail seven inches long. There are many known instances of the elongation of the caudal vertebræ, as in the Poonangs of Borneo."

Dr. Hubsch, physician to the hospitals of Constantinople, says: "It was in 1852 that I saw for the first time a tailed negress. I was struck with this phenomenon, and I questioned her master, a slave dealer. I learned from him that there exists a tribe called Niam-niam, occupying the interior of Africa. All the members of this tribe bear the caudal appendage, and, as oriental imagination is given to exaggeration, I was assured that the tails sometimes attained the length of two feet. That which I observed was smooth and hairless. It was about two inches long, and terminated in a point." Then, after describing this negress at length, he proceeds to say: "I know also at Constantinople, the son of a physician, aged two years, who was born with a tail an inch long; he belonged to the white Caucasian race. One of his grandfathers possessed the same appendage."

I have before me a volume entitled "The Travels of Marco Polo," and turning to the index I find the words "Tailed Men." Looking up the reference I find this statement: "In this kingdom [Lambri, in the island of Sumatra] are found men with tails, a span in length, like those of the dog, but not covered with hair. The greater number of them are formed in this manner, but they dwell in the mountains and do not inhabit towns." Marco Polo was the celebrated Venetian traveler of the thirteenth

century. He is noted for his extensive research, the minuteness and accuracy of his statements, and as being the first European who visited Eastern countries and wrote up a detailed account of them. His works stimulated others to geographical research, and among the results of his influence was the discovery of America by Columbus two centuries later.

Now, it is a question whether this great traveler intentionally deviated* from the truth. He doubtless saw on the island of Sumatra what he supposed were men with tails. He could very easily have been mistaken. These supposed tailed-men were, undoubtedly, a species of monkey which rather closely resembled man. It will be remembered that Linnæus, the great naturalist who lived nearly five hundred years later, described a race of men with tails, and covered with hair. Now, it is very likely that all the travelers who have written since Marco Polo's time, have simply borrowed their ideas of tailed men from his writings. Although Marco Polo may have been simply mistaken in this case, he makes many other statements which can be explained on no other hypothesis than that he, like the majority of writers of his day, had very little regard for truth.

I can imagine these subsequent writers calming their consciences by pointing to the statement of this great father of travelers. Such stories forming a part of the writings of travelers simply illustrate the fact that mankind is credulous, and has a strong love of the marvelous. Truth is stranger than fiction, but men are more ready to believe the latter than the former. This is illustrated by the story of the old woman whose son had been a traveler in foreign lands. The young man told his mother that he had seen rivers of milk and mountains of sugar, and fish that could rise up out of the water and

fly for some distance. The old woman replied: "You may have seen rivers of milk and mountains of sugar, but you needn't try to make me believe that fish can fly."

"Practically," says Frances Power Cobbe, "we all jump easily at beliefs toward the level of which we have already climbed by previous knowledge (or previous prejudice, as it may chance to be), and refuse, donkey-wise, to budge an inch toward those which happen to be on a plane above our preconceived notions of what either is or ought to be."

THE MAN IN THE MOON.

Among the myths which obviously have originated in the desire to explain natural phenomena, are those in reference to the appearances of the moon. I remember having asked my father when I was quite small if there really was a man in the moon, and he replied that there was, and that he was placed there because he had been guilty of breaking the Sabbath by burning brush. In England the nurses tell the children that the man in the moon was the one referred to in Numbers xv., 32-36, where the account of the man breaking the Sabbath by gathering sticks is given. But there is no reference in the Bible to the moon. The German version of the tale is somewhat different. A man once went into the woods to gather some wood. He cut a quantity, tied it in a bundle, and shouldering it, began to trudge homeward. On the way he met a well-dressed man on his way to church. This man said: "Do you know that this is Sunday on earth when all must rest from their labors?" "Sunday on earth or Monday-in heaven, it is all one to me," replied the woodcutter. "Then bear your bundle forever, and as you value not Sunday on earth yours shall be a perpetual Moon-day in heaven; and you shall stand for eternity in the moon, a

warning to all Sabbath breakers," said the man, and immediately vanished, while the woodcutter was caught up into the moon with his bundle, and there he stands to this day. In some parts of Germany they tell of two persons in the moon, a man who was put there for strewing thorns in the church path and a woman for making butter on Sunday. The man, they say, can be seen with his bundle of thorns, and the woman with her butter tub. The Dutch story is that the man stole vegetables.

Some imagine they see a dog also in the moon. Shakespeare alludes to the man and the dog in the moon in "The Tempest," and in "Midsummer Night's Dream." In England there is preserved an old seal appended to a deed, which is dated 1335. On the seal is the picture of the moon containing a man with a bundle of sticks, and followed by a dog.

The Swedish peasants explain the spots in the moon as representing a boy and a girl carrying a vessel of water between them, and there is a Scandinavian myth which says that Mani, the moon, stole two children, Hjuke and Bil, as they were drawing water, and carried them to heaven. The nursery rhyme of "Jack and Gill" is supposed to have originated in this myth, the fall of Jack and Gill representing the disappearance, one after the other, of the spots in the moon as it wanes. The natives of British Columbia seem to have believed in a man in the moon, judging from certain practices of their medicine men. The Buddhists have a legend which represents the founder of that religion as having once existed in the form of a hare, who lived friendly with a fox and an ape. To test the virtue of the hare, Indra, the god, came to the animals in the form of an old man asking for food. The three animals went hunting, the fox and the ape returning successful, but the hare could find nothing, but showed his devotion

by offering himself as food. In reward for this noble self-sacrifice the god placed the hare in the moon.

According to Baring-Gould the old Norse myth, from which the Jack and Gill story originated, had a deeper meaning than the mere explanation of the spots or cloudy appearances on the moon. The word Hjuki is from a word which means to heap or pile together, or increase, and Bil, from a word meaning to dissolve or disappear. These terms then, meant nothing more than the waxing or waning of the moon, and the water carried by the boy and girl represents the rainfall depending upon the phases of the moon. This author says: "But, though Jack and Gill became by degrees dissevered in the popular mind from the moon, the original myth went through a fresh phase, and exists still under a new form. The Norse superstition attributed *theft* to the moon, and the vulgar soon began to believe that the figure they saw in the moon was the thief. The lunar specks certainly may be made to resemble one figure, and only a lively imagination can discern two. The girl soon dropped out of popular mythology, the boy oldened into a venerable man, he retained his pole, and the bucket was transformed into the thing he had stolen—sticks or vegetables. The theft was in some places exchanged for Sabbath-breaking, especially among those in Protestant countries who were acquainted with the Bible story of the stick gatherer."

The reader will at once connect in his mind these stories with the common belief in the influence of the moon over the weather, especially the rainfall. It is rather difficult, however, to account for all the peculiar beliefs in the influence of the moon upon the growth of vegetables and animals, upon the mind, and as affecting the labor of man. The idea that the moon in some way influences the growth of vegetables and other processes, is so thor-

oughly grounded in the minds of people that to-day very intelligent and sensible people in our own country continue to be governed in their time for planting, slaughtering animals, etc., by the phases of the moon, and expect changes in the weather as often as that luminary changes her countenance.

James A. Farrar, in his work "Primitive Manners and Customs," says in regard to the beliefs concerning the moon: "English country boys, when on the sight of a new moon they turn the money in their pockets to insure a constant supply there, have no idea of the reason that once underlay the practice. But a wide comparison of customs supplies us with a key; for we find everywhere a prevalent mental association between the increase or wane of the moon, and the increase or wane of things on the earth. Maladies, it is thought, will wane more readily if the medicine be taken in the moon's wane, and wood cut at that time will burn better, just as, on the other hand, crops are more likely to be plentiful if sown while the moon is young, and marriages more likely to be happy. In some English counties pigs must be killed at the same season, lest the pork should waste in boiling. In Germany it is the best time for the father of a family to die, for in the latter half of the month his death would portend the decrease of his whole family; it is also the best time for counting money which it is desired may increase. An invalid in face of a waning moon should pray that his pains may diminish with it. Hence, too, the French idea that hair cut in the moon's wane will never grow again, or the similar one in Devonshire and Iceland, that the rest will fall off; and hence, probably, the popular belief that the weather of the new moon foreshadows the weather for the month. But are all these fancies relics of an old moon-worship, or simply expressions of that feeling, once

so prevalent, that there existed an intimate sympathy between man and nature, and that everything which affected the former was, in some way or another, typified by the latter? Analogy seems to favor the latter hypothesis."

The author then adduces as evidence of the latter hypothesis the fact that in many places certain affairs of men are supposed to be in sympathy with the ebbing and flowing of the tides of the ocean, and the cases where remedies for disease are used because of their resemblance to the disease, as bloodstone for nose bleeding, nettle tea for nettle rash, turmeric, on account of its yellow color, for jaundice, the lungs of a fox for asthma, etc.

PIGMIES.

The Greeks and Romans believed in a race of people very diminutive in size, which they called Pygmies, from the Greek word "*pygme*," the fist, or a measure extending from the elbow to the fist. They were said to be only about thirteen inches in height. Homer describes them as inhabiting the coasts of Oceanus, and says that every spring they were attacked by the cranes, and waged terrible wars with them. Later writers speak of them as inhabiting the shores of the Nile near its mouth, also as existing in the interior of Africa. They were also supposed to inhabit the country east of the Ganges River, and to live in subterranean dwellings. The Greek writers were fond of picturing the actions of these little people. They said they cut down the grain one stalk at a time with axes, and when Hercules visited their country they climbed up into his cup by means of ladders, and when he slept two great armies of them attacked him, one on his left, the other on his right, but the hero captured them all by rolling them up in his lion-skin robe.

Herodotus, who is considered as a very reliable Greek

historian, speaks of the Pigmies seriously as an existing race, and it is supposed that he wrote from the accounts of other travelers who had mistaken a small species of monkey for a race of dwarfish men. Aristotle, the great Greek philosopher, thought there must be some foundation for the stories, although he did not believe all that was said about them.

Marco Polo, who makes such positive statements regarding men with tails, says concerning Pigmies: "It should be known that what is reported respecting the dried bodies of diminutive creatures, or Pigmies, brought from India, is an idle tale, such pretended men being manufactured in this island (Sumatra) in the following manner," and he goes on to describe minutely how they embalmed the bodies of small monkeys, shaved off the hair and sold them to traders as specimens of pigmies.

Many of my readers are familiar with the story of the Lilliputians, as related by Dean Swift in his "Gulliver's Travels." It is easy to see the foundation of Swift's admirable work. But what concerns us at present is the question whether there really ever existed a race of dwarfish people which might have given rise to the belief, or is the whole thing a myth or fabrication? Dr. Krapp, a German missionary, reported in 1850 that he had found a tribe of negroes of such diminutive stature as to be called dwarfs, and points to them as the origin of the pigmy stories. Dr. Schweinfurth, a later traveler, makes more definite statements, and gives the height of these people as four feet and ten inches, which is certainly far from a pigmy altitude. The Bushmen are even smaller than these negroes, and are not called dwarfs. We may conclude, then, that the whole story is the result of the indulgence in imaginative speculations, and is only another illustration of the fondness for marvelous statements.

THE AMAZONS.

According to a Greek tradition there lived in the northeastern part of Asia Minor, near the shores of the Black Sea, a race of women whose principal occupation was hunting and warfare. They maintained their race by making excursions to neighboring countries, and capturing men. When children were born the males were either sent out of their country or crippled and made slaves of. The name Amazon was said by some to mean "breastless," because they cut off their right breasts so as to give them more freedom in the use of the bow. By others the name was supposed to mean "strong-breasted." The origin of this myth is obscure, but it is probable that it was only an exaggerated account of the peculiar manner in which the people of that



FIG. 167.—AMAZON.

part of Asia lived, the women acting as soldiers, and performing many of the ordinary labors of men.

In Virgil's *Æneid*, Penthesilea, queen of the Amazons, is represented as leading her female warriors in the thickest of the battle, assisting her Trojan allies. The Amazons carried a crescent-shaped shield, shown in fig. 167. An Amazon archer is represented in fig. 168.



FIG. 168.—AMAZON.

EL DORADO AND THE FOUNTAIN OF YOUTH.

The people of Spain, in the sixteenth century, believed in the existence of a region somewhere in the interior of

South America, which abounded in gold and precious stones. Many expeditions were fitted out for the discovery of this country, and although all proved a failure, there continued to be rumors of its existence down to the eighteenth century, and Sir Walter Raleigh, the great English explorer, made two visits to South America in the hopes of discovering it. This fabulous country was called El Dorado, or the land of gold.

Juan Ponce de Leon, the old Spanish cavalier, as all school boys know, started out to seek a Fountain of Youth, in which he might bathe and become a boy again. This fountain was said to be located on an island called Bimini, lying far out in the ocean. But instead of finding Bimini, our explorer immortalized his name by discovering Florida.

FABULOUS ANIMALS, PLANTS AND MINERALS.

The active imagination of the ancients left no field untouched. They not only peopled the forests, streams and mountains, the air and the caverns of the earth with gods and demons, and spiritual beings of every sort, but they believed in the existence of strange animals, and plants and minerals with wonderful properties. I shall here attempt to give a brief account of some of these beliefs.

Who has not heard of and seen pictures of the Phœnix, and who has ever seen the strange bird? The Roman poet, Ovid, seemed to be quite familiar with it. He says: "Most beings spring from other individuals, but there is a certain kind which reproduces itself. The Assyrians call it the Phœnix. When it has lived 500 years it builds itself a nest in the branches of an oak, or on the top of a palm tree. In this it collects cinnamon, and spikenard, and myrrh, and of these materials builds a pile on which it deposits itself, and dying, breathes out its last breath

amidst odors. From the body of the parent bird a young Phœnix issues forth, destined to live as long a life as its predecessor. When this has grown up and gained sufficient strength, it lifts its nest from the tree (its own cradle and its parent's sepulcher) and carries it to the city of Heliopolis, in Egypt, and deposits it in the temple of the Sun." The fable of the Phœnix was probably a simple attempt to symbolize the immortality of the soul.

The Salamander was another remarkable animal. It could not only live in the fire, but could extinguish it. It is described by Greek and Roman writers. There is, indeed, an order of animals of the frog kind which take today the name of salamanders, and the belief that they can endure fire still holds among the lower classes in some places. These animals are often found under rubbish, and when a fire is made the heat disturbs them, and they are able to escape by running swiftly over the coals, being protected by a sticky fluid exudation from their bodies. This being the case it is not strange that such a notion as their being fireproof would arise. The mineral asbestos is often called "Salamander's wool," because it can be woven into a fire-proof cloth.

Pliny, the Roman naturalist, describes the Unicorn as a "very glorious beast, similar in the rest of its body to a horse, with the head of a deer, the feet of an elephant, the tail of a boar, a deep, bellowing voice, and a single black horn two cubits in length, standing out in the middle of its forehead. It cannot be taken alive." I need not add that it has never been seen, either dead or alive. The original of this fabulous beast was, doubtless, the one-horned rhinoceros.

Pliny also describes the Basilisk, or Cockatrice. This was truly a dangerous animal, for it could kill by its breath, or even by its look. If a man on horseback struck

it with a spear, a poison was communicated through the weapon, and killed both man and horse. The animal was hatched by toads or serpents, from the eggs of a cock. It is represented as having the body of a serpent covered with scales, and with the wings and feet of a bird.

Many people still believe that cocks lay eggs, and it was once generally believed in Europe that they sometimes laid eggs from which came dangerous serpents. In 1383, in Ireland, a cock was tried and convicted of having laid a serpent egg, and was condemned to be burned at the stake, and it was said that when the fire touched the egg there issued from it a serpent-like creature, which perished in the flames. In 1474 a similar case occurred in France, the cock and egg being burned publicly, a great concourse of citizens assembling to witness the execution. I remember when a boy, being told that the small eggs sometimes found in the nests of hens, were laid by roosters, and that if I wished to have good luck I must, when I found such an egg, throw it over the house.

The Griffin was an imaginary animal, said to be a cross between the eagle and the lion. It is represented as having wings and a beak like an eagle, but with the body and limbs of a lion.

Dragons were fabulous animals, generally represented as huge lizards, with wings and a barbed tail.

The Roc, or Rukh, was a bird, according to Arabian mythology, which was so large and strong that it could carry off an elephant. Those who have read the *Arabian Nights* are acquainted with the wonderful dimensions of this bird. Marco Polo says that the people of Madagascar reported to him that at certain seasons of the year this bird made its appearance from the south, and that he was told by persons who had seen the bird, that its wings when spread would measure sixteen paces from point to

point, and its feathers were eight paces in length and thick in proportion. The existence of this bird seems to have been universally believed throughout the Eastern nations. The story may have taken its rise from the appearance of a real bird of large size, such as the albatross, which has a spread of wing of fifteen feet.

SEA MONSTERS.

When news becomes scarce, or there is a lack of other sensational matter, our newspapers may be expected to contain accounts of a monster sea serpent seen from some vessel. Notwithstanding we have these accounts sworn to by apparently good authorities, there are few persons in our time who are not skeptical upon this question. Yet there are some modern scientific writers who are inclined to think that there may be some huge species of cuttle fish, or marine snakes, which are not yet known to science, but have been seen occasionally, and, though magnified by the fears of the sailors who beheld them, yet are sufficiently large to merit the name of monsters.

One old writer describing sea serpents, says: "They are ten or twelve cubits long, very black, and with huge eyes, the compass whereof is about eight or ten cubits. The apple of the eye is of one cubit, and is red and fiery colored, which in the dark night appears to fishermen afar off under waters as a burning fire, having hairs like goose feathers, thick and long like a beard hanging down. One of these sea monsters will easily drown many great ships, provided with many strong mariners." This account is purely fanciful, but there are several accounts subscribed and sworn to by officers and men, describing monster serpent-like animals seen from the decks of vessels. One of these accounts bears date of January 10, 1877, and is in the form of an affidavit made before the Liverpool

Police Court. Many have thought that these men were simply deceived by appearances. A huge mass of floating sea weed on the wreck of a vessel, or floating trunks of trees, might easily be mistaken for huge animals at a distance.

The Norwegian sailors believed in the existence of an immense sea serpent, which they called the *kraken*. Before the time of Columbus navigators were afraid to venture far from shore, mainly because of the belief in the existence of huge monsters which would swallow up their vessels.

Victor Hugo has described in his novel, "The Toilers of the Sea," a huge creature which he calls the "Devil Fish." The discovery of some gigantic specimens of cuttle fish has rendered his fancy almost a realization. One was cast ashore on the banks of Newfoundland, a few years ago, the arms, or tentacles of which measured twenty-four feet, and its eyes were four inches in diameter.

Speaking of creatures of the sea one is naturally reminded of mermaids and sirens. The mermaid was a fabulous creature, the upper part of which was like a beautiful woman, and the lower part like a fish. Sometimes creatures half man and half fish were described under the name of mermen. The sirens were beings of the Grecian and Roman mythology, and were represented as existing in the sea in a form part human and part animal, and who so entranced the beholder with their singing that he had no power to move, and perished from starvation. The belief in mermaids is wide-spread, and existed to within recent times. It was no doubt a relic of the ancient belief in the sirens, and was kept alive by the fact that seals and walruses bear a remote resemblance to a human form, and were often mistaken for sirens. Columbus imagined he saw mermaids in the sea. Our great showman,

P. T. Barnum, indeed advertised and exhibited what purported to be a stuffed mermaid, which turned out to be only the skin of a monkey ingeniously joined to the body of a fish, but the fraud was not discovered until thousands of people had been convinced that they had seen a real mermaid.

Everybody in this country has heard that horse hairs change to snakes, and there are not a few who believe it. How could such an absurd notion arise? Easily enough. There is a species of worm called the hair worm, which looks as much like a piece of a hair from a horse's tail as one could imagine, but it is a worm, nevertheless, and naturalists know its history and habits.

If a newspaper contains no account of a sea serpent, we may expect to find a well authenticated statement concerning a live frog or toad which was found in the heart of a sound oak tree or in the center of a solid rock, where it had doubtless existed for years without air, water, or food. It is needless to state that these stories must all be taken with a due degree of allowance, although from the nature of such cold-blooded animals they are capable of sustaining life for a considerable time under very peculiar circumstances. Experiments have been tried, and the results prove that a good foundation at least exists for such stories. Snakes and toads may be sealed up in bottles or in cavities in rocks, and kept for at least a year without food, and with no more air than the small cavity would contain.

PLANTS, MINERALS, ETC.

A curious belief of the Middle Ages was that concerning the so-called "Barnacle Geese." A barnacle is a kind of crab which is inclosed in a shell, and attached by a fleshy stalk to some fixed object. Now, there was a common be-

lief that these barnacles were a vegetable production growing upon trees, and that when they reached a certain stage of maturity they burst open, and from them emerged full-formed geese. In 1527 a book on the history and geography of Scotland appeared, in which the author discredits the popular belief that the geese grew on trees. He says: "Some men believe that the geese grow on trees by their bills. But their opinion is vain. And because the nature and procreation of the geese is strange, we have made no little labor and diligence to search the truth and verity thereof. We have sailed through the seas where the geese are bred, and I find by great experience, that the nature of the seas is more relevant cause of their procreation than any other thing." I presume that the readers of this book were entirely satisfied with this explanation. How the idea that geese grew upon trees, or were produced by "the nature of the seas," could ever obtain a hold in men's minds is, indeed, a mystery, unless we consider that the men of the past, like the children of to-day, had an extraordinary love for marvelous stories.

Sir John Mandeville, a noted English traveler (b. 1300), describes a peculiar kind of fruit which grew in China. He says: "There groweth a manner of fruit as though it were gourds, and when they been ripe, men cut them in two and find within a little beast, in flesh, in bone and blood, as though it were a little lamb without wool, and men eat both the fruit and the beast." There may be a foundation for this story in the fact that the "vegetable lambs" of Thibet do really resemble lambs somewhat.

Scaliger, the learned Italian, in 1525 gave a minute description of the lamb plant, which he said grew in Tartary. He said: "Its pulp was eaten as flesh, blood issued from it, and it had wonderful sweetness."

The *Mandrake* is a plant having a fleshy root, often forked, and bearing some resemblance to the human figure. It was once supposed to have sensation like an animal, and that it would cry out when pulled from the ground. This is what Shakespeare means in the line, "and shrieks like mandrakes torn out of the earth." The magicians of ancient times carved faces upon these roots, and made the people believe they came from the ground that way. They were considered as powerful charms, and during the Middle Ages they formed a considerable article of traffic in Europe. Josephus, Pliny, and other historians, speak in high terms of the virtues of these charms.

It is a common belief in this country among ignorant people, that snakes have legs, and the reason why we do not see them, they say, is because as soon as they stop running they draw them into their bodies. They say that if a snake be caught alive and put on hot coals it will put out its feet.

Who has not heard of "crocodile's tears"? The notion that this animal shed tears and uttered plaintive cries that worked upon the sympathies of men, and thus lured them within reach of its jaws, was a very common one in old times. Sir John Mandeville describes crocodiles as "serpents which slew men and devoured them weeping." Andrew Wilson offers an explanation of this belief. He says these animals do emit loud and plaintive cries, and the early travelers would naturally associate the cries with tears.

Of mythical plants the "Upas tree" is the most noted. It was believed that this tree was so deadly that no other plant could exist in its immediate vicinity, and that birds flying over it would drop dead, and no animal could safely come near it. Now, there is a tree growing in the East Indies which is called the upas tree, the juice of

which is like that of many tropical plants, very poisonous when introduced into the blood of an animal, but beyond this the story is fabulous. The foundation for the story lies in the fact that in Java there is a narrow valley where neither animal nor vegetable life can exist, because of poisonous gases which are emitted from the earth, and birds flying over it are sometimes stupefied and fall to the ground.

The earlier chemists spent much of their time and energy searching for the fabulous "philosopher's stone," a substance which was believed to have the power of converting all other metals into gold. They also sought another substance which was believed to have an existence, and which had the power of indefinitely prolonging human life. This they called the "elixir of life." Roger Bacon, a philosopher of the thirteenth century, had great faith in the "elixir of life." It was then known that gold could be dissolved in a mixture of nitric and muriatic acids. This solution of gold Bacon believed to be the "elixir of life." Thomas Aquinas considered alcohol to be this "elixir." It is needless to say both of these gentlemen were mistaken.

Many people, even to-day, believe in the existence of a "mad stone," which, when laid upon the wound made by a rabid animal, will remove all danger. The belief seems to be wide-spread, although I have been unable to find authentic history of it. It is said, however, that the stone is found in the stomach of a certain species of deer found in parts of South Carolina. Its growth is similar to that of the pearl.

In this connection may be mentioned the belief in love potions, or philters, so common in the past ages. They were supposed to be a sure means of inspiring and securing love. Among the Greeks and Romans they were in

continual use. Their composition is not known, but they were probably composed of some powerful drugs which had an influence upon the nervous system, as the result of their use was often derangement of the mental powers, sometimes followed by insanity and death. Lucretius, the Roman poet, is said to have been driven to insanity by a love potion, and to have committed suicide as a consequence. The Chinese, and other Eastern people, believe in their efficacy, and use them to this day.

MYTHS AS EXPLANATIONS OF NATURAL PHENOMENA.

In former chapters I have attempted to show that myths were usually attempts of the savage mind to explain natural phenomena. In this chapter I have intimated that some mythical stories might have originated merely in the desire to relate something marvelous. I propose to notice here a few interesting examples of the attempts to account for natural phenomena by assuming certain facts. These facts are sometimes strange enough, yet not more absurd than some of the conclusions of scientific men.

The huge bones of extinct animals, as mammoths and mastodons, were formerly supposed to be the remains of giant men. St. Augustine argued that there were giants before the flood, and to prove his position declared that he had himself seen a molar tooth of a man large enough to make a hundred teeth of the men of to-day. The loose boulders we find everywhere over the northern portion of the United States and in some parts of Europe, have caused much thought and speculation among scientific men in attempting to account for their origin. The peasants of Scotland explain their presence in a manner satisfactory to themselves by the following legend:

In old times one Michael Scott and the devil entered

into a contract with a band of witches to dam up the river Clyde. The witches were to carry the stones for the dam from another part of the country where the same kind of rock is found in ledges. A part of the contract was that the name of God must not be mentioned while the work was going on. All went well for a while until one witch, staggering under the weight of a large boulder, cried out, "O Lord, but I'm tired." This broke the spell, and instantly every boulder dropped to the ground, and neither witch, Michael Scott nor the devil could move them, and there they lay to this day, scattered over the country.

Others have explained the presence of boulders by the theory that they were used by giants in warring with each other, a tract covered with them being one of their great battlefields.

The stone axes and wedges of prehistoric man are called "thunderbolts" by the common people where they are found. This is a relic of a notion that they were some sort of weapons used by the gods. The natives of Brazil and of Malay and Java believe to-day that these relics are the weapons of the gods. The scientific men of the last century were not much nearer the truth when they said the axes, arrow points, etc., were symbols used by heathen nations in religious ceremonies.

Certain peculiar hollows in rocks have been supposed to be the footprints of the devil. Peculiarities of animals have been accounted for by various ingenious stories. For example, the bear has a short tail, because the fox cheated him out of it by some cunning trick; the bird known as the cross-bill twisted its bill by attempting to pull out the nails from the hands of Christ on the cross; the peculiar brown marks on the fish called the haddock were the finger marks of St. Peter, this being the fish which St. Peter caught when Christ told him to cast a hook into the

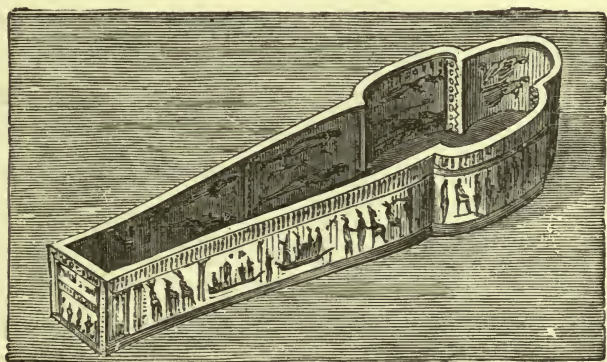
sea. The Quiches of Central America had a legend which explained why deer and rabbits have short tails. The gods one time wished to fell the timber, but the animals objecting, set the trees in place again at night. Then the gods secreted themselves and attempted to catch the animals when they came the next night. The lions and tigers escaped by jumping over the fallen trees, but the deer and rabbits were caught by the tails. The rat was caught in a handkerchief and squeezed so tightly that his eyes popped out and they held him over the fire and burned all the hair off his tail.

According to a German legend the owl flies by night because he was once set to watch the hole where a wren had entered, and falling asleep the wren escaped him, and from that time on he was ashamed to show himself in daytime. "European folk-lore," says Farrar, "accounts for the redness of the robin's breast, either by the theory that he extracted a thorn from the thorn-crown of Christ, or by the theory that he daily bears a drop of water to quench the flames of hell."

The clouds, the sun, the moon, the stars, thunder, lightning, winds, rain, are all explained in the philosophy of the savage mind by giving them an earthly or personal comparison. Thus the clouds were shaggy fleeces which wrapped up the sky to keep it warm, or horses running, or swans swimming on the sea of heaven. The sun was a chariot driven through the sky, a blazing shield, an egg laid by the dawn, a golden flower opening in the morning and closing at night, a bird dying in the fire and rising again from its ashes. The moon was a virgin queen in a silver boat, a lamp hung in the heavens, a woman fleeing from the pursuing sun. The stars were cups out of which the gods drank, diamonds shining in the dark valley where night brooded over her egg, the moon. Thunder was the

roll of chariot wheels, the shutting of the doors of heaven, an angel's trumpet. Lightning was a serpent striking his victim, a luminous fish darting through the waters of the sky. The winds were the breath of the Great Spirit, or made by a god with a fan, or something let out of a cave by a being who had special charge of them. Rain was the tears of nature.

The origin of these personifications of the powers of nature is very apparent. To the vivid imagination nature presents an aspect totally different from that perceived by the dullard. Some persons without the slightest stretch of imagination can see animals form and dissolve in the clouds, and discern the outline of the human countenance in the forms of foliage, or even in the dust, just as some see beauty in a landscape where others see none.



INNER COFFIN OF EGYPTIAN MUMMY.

CHAPTER XI.

HUMAN DWELLINGS AND HOME LIFE IN ALL AGES AND COUNTRIES.

Civilization may be said to begin when men commence to build homes and cease to wander from place to place seeking their sustenance wherever chance may direct them. The earliest civilizations were in the most fertile parts of the earth, where the abundance of food rendered a dense population possible. There men formed fixed and settled habits of life and developed a patriotism, or love of home and country. Little, then, can be said of the home life of pre-historic men, for they were generally wanderers on the face of the earth, living by hunting and fishing, or were sustained by their flocks and herds, which they were obliged to move from place to place in search of food. We can imagine the pre-historic hunter in his cave, or rude hut, during the intervals when not upon the chase, engaged in fashioning and polishing his weapons of stone, and constructing his garments of skins, amusing himself, perhaps, occasionally by attempts to decorate his weapons with rude drawings or carvings.

As among savage tribes to-day the men no doubt engaged in war and the chase, or attended to the flocks and herds while the women performed all of the household drudgery, such as preparing the food, making garments, and constructing dwellings.

The employments of men and women were at first few

and simple, but as civilization advanced a greater variety of occupations were developed, and a division of labor began to take place. Man is by nature an active, restless being, and as he develops in the scale this peculiarity increases. As he ascends in the scale of civilization his wants multiply, hence the great variety of employments, and along with them amusements and diversions of every kind. The savage, like the snake, is active at times, when it is necessary to seek his food or to gratify his passions, but when his wants are satisfied he can spend hours in perfect idleness and inactivity, but the civilized man needs constant change, rapid and frequent alternation of exercise and rest. From these general facts we may expect to find the home of the civilized man of to-day containing a greater variety of objects and his daily life made up of a greater variety of actions.

HOME LIFE OF THE ANCIENT EGYPTIANS.

From pictures and sculptured bas-reliefs we are able to learn much of the home life of the Egyptians four thousand years ago. One of the first elements of a true home is the sacredness of the marriage relation. The Egyptians it seems did not practice polygamy, at least to any great extent, and the mutual affection of man and wife seems to have been great, as indicated by the numerous pictures in which they are represented as sitting close together. In their general treatment of women they were far beyond the other nations of their age. Wives and daughters of kings succeeded to the throne the same as male branches of the royal family.

Their houses were made to suit the climate, being open to admit currents of air. Sometimes wind-sails were fixed on the tops of houses to conduct currents of air into the chambers below. The houses were generally built of

brick, painted with many bright colors. It was a common custom to place over the door the inscription, "The good house," or the name of the reigning king under whom the owner held an office. The people spent much of their time out of doors, as is the custom in all mild climates.

The people of Egypt were divided into castes, the first and highest consisting of the priests; the second, the soldiers; the third, the farmers, gardeners, huntsmen and boatmen; the fourth, the artisans and tradesmen, the fifth,



FIG. 170.—ANCIENT EGYPTIAN WOMEN.

the common laborers. The son nearly always followed the occupation of his father. Social intercourse then, was only between members of the same caste.

Many animals were tamed and kept for various purposes. The lion, the leopard, the gazelle, the crocodile and the baboon and monkey were tamed, and kept as pets, or to perform various duties. Monkeys were employed to gather fruit from trees and to carry torches at evening entertainments. Sometimes a monkey

would become unruly and throw his lighted torch among the invited guests, causing quite a consternation.

Large quantities of wine were consumed. They made beer from barley. They were very fond of flowers and rare plants, and the houses of the rich were rarely ever without bouquets or wreaths and chaplets. They made rare trees and flowers a part of the tribute exacted from conquered foreign nations.

Their rooms were tastefully furnished, containing chairs, footstools and tables similar to ours of to-day. The

wealthier classes used wooden or bronzed bedsteads and had pillows of wood made to fit the neck. The poorer classes sat upon their heels or flat upon the ground. It was a mark of respect to superiors for a man to sit upon his heels, or to kneel and kiss the ground.

The rich were attended by numerous servants who sometimes carried them to parties and entertainments in palanquins, and held parasols or umbrellas over their heads.

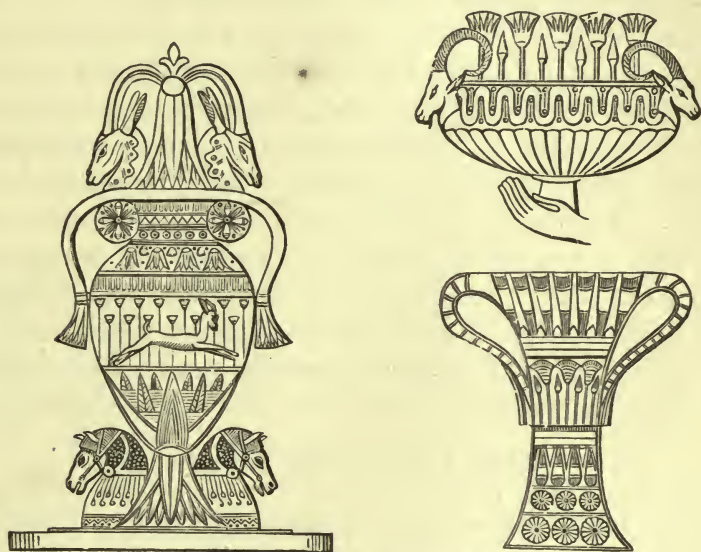


FIG. 171.—GOLD VASES, EGYPT 4,000 YEARS AGO.

The guests at a party were entertained by music, songs, dancing, buffoonery, feats of strength and agility and various games of chance, and served with all the luxuries the table could afford. Persons arriving from a journey took off their shoes and were presented with water to wash their feet before entering the house. Their tableware and household ornaments were often elegant and very costly. The accompanying engraving represents beautiful vases of pure wrought gold.

The occupations of the people were carefully watched by the magistrates or rulers. Every person was required to work at some trade or profession. In order effectually to carry out these requirements, every person was compelled to report at certain times to an officer, stating his name, place of abode and occupation, which information was carefully registered. In approaching these officers it was the custom to make a profound bow, one hand falling to the knee, the other placed over the mouth.

The food of the lower classes was of the most simple and inexpensive kind, but the rich indulged in a great variety of dishes. The mode of eating was similar to that now existing in Eastern countries, the persons sitting around a table and dipping their bread into a dish in the center. They seem to have been acquainted with many methods of preparing meats and vegetables, the science of cooking having reached a high degree of development.

Owing to the mildness of the climate, much clothing was unnecessary. Children generally went entirely naked, and adults often without covering for their feet and limbs.

HOME LIFE OF THE GREEKS.

The home life of the Greeks is depicted in the writings of their literary men, and inferred from relics which have survived the ravages of time.

Their dress was simple, that of the sexes differing but little. Wool, linen and cotton were the materials used. The women wore no covering upon the head, and among the men only travelers and certain kinds of tradesmen wore hats. In the house they wore nothing upon their feet. Out of doors they wore sandals, or sometimes shoes (fig. 78). Both men and women wore jewelry.

According to the descriptions of Homer, the royal palace of the early Greeks was divided into three parts,

the first division intended for every-day life and social intercourse, and consisting of a court-yard which opened into the street through a double door. In the middle of the court stood a statue of Zeus, the protector of dwellings. This court was surrounded by storerooms, bedrooms for servants, and stables for horses and cattle. Opposite the gate of the court-yard was the dwelling-house. At the front of the dwelling was a portico of large size. The door opened into a large hall, the *prodomos*, in which the guests slept on couches. Back of the *prodomos* was the hall of the men, the women's room, the connubial chamber, the armory and the treasury. The hall of the men was the principal room in the palace. The floor was of stone, and the walls covered with polished pieces of metal. A hole in the roof served to let out the smoke, and admit light. The third division of the house was devoted to the family circle.



FIG. 172.—GREEK BASKETS.

As a rule, the Greeks concentrated all their wealth and skill upon their public buildings and palaces, the private residences being small and simple. Homer does not even mention private dwellings.

The sacred place in a house was the hearth. It was first used only for cooking, but when a separate kitchen was adopted,

the hearth was kept as an altar on which offerings were made, on the occasion of important household events, as births, naming of children, marriages and deaths.

Their food was mostly vegetable. Wines were used

freely. They reclined at their meals (fig. 118) during the later periods of their history. Earlier, however, it appears that like the Egyptians, they sat around a table. Some pictures represent the men only as reclining, the women and children sitting. Spoons and knives were used at meals to a limited extent, but forks were unknown.



FIG. 173.—GREEK TORCHES.

Honey was used instead of sugar; butter was little used, and many kinds of cakes were made.

In Homer's time rooms were sometimes lighted and heated by fire-baskets, or fire-basins standing on high poles, and replenished with dry wood. They endeavored to keep fire by covering the embers with ashes.

Sticks of pine wood, and the bark of the vine were used for torches. A common form of a Greek lamp is shown in the cut. They were made of earthenware or metal. The Athenians used lanterns made of transparent horn. Many domestic utensils were made of basket work.

The Greeks paid much attention to personal cleanliness, and bathing arrangements were quite common in their houses. Gymnastic exercises and games, such as boxing, wrestling, leaping, running, etc., which were calculated to develop the physical powers, were encouraged.

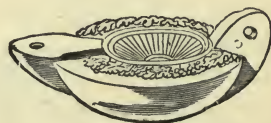


FIG. 174.—GREEK LAMP, TO BE SUSPENDED BY CHAINS.

Some of the styles of seats used by the Greeks are shown in the cut. Some of the chairs could be folded, and it was a custom among Athenians to have these folding seats carried after them by slaves. Sofas or lounges were found in the sitting-rooms of the wealthy in the later periods. They were covered with soft blankets of brilliant colors, and cushions were used to support the body in a half-sitting posture. On these sofas the occu-

pants were accustomed to read, write, and take their meals. Beds in the days of Hômer were simple, consisting of a kind of matrass, or blanket spread on a frame, or on the floor, the sleeper covered with linen sheets, or his own clothing. In later and more luxurious times, matrasses and pillows stuffed with wool or feathers were used.

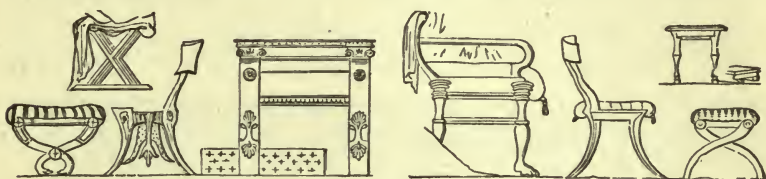


FIG. 175.—GREEK STOOLS AND CHAIRS 2,000 YEARS AGO.

Chests, or drawers, and upright cupboards seem to have been unknown, but boxes resembling our modern trunks were used for keeping articles of dress and valuable utensils and ornaments. The furniture of houses, though in the main very simple, was beautiful and artistic.

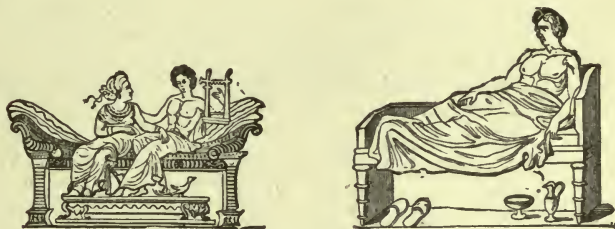


FIG. 176.—GREEK LOUNGES OR SOFAS.

Business affairs among the Greeks were attended to in the forenoon, and in the afternoon the men spent their time in visiting and talking on political questions. In Athens the women spent most of their time closely confined to the house. Intellectual intercourse between men and women was wanting. Women were considered far inferior to men, and although their honor and virtue were

carefully guarded, they were not thought competent to engage in intellectual pursuits. Their chief employments consisted in preparing the meals and spinning and weaving. They sometimes occupied themselves in embroidering and in painting vases. Girls were encouraged to take outdoor exercise in order that they might develop strong bodies, and thus be better fitted to become mothers and be the means of strengthening the race.

The Spartans ate at public tables. Their food was very plain, chiefly black bread and broth. In most things they differed from the other Greeks.

HOME LIFE OF THE ROMANS.

A typical Roman dwelling house consisted of the atrium, a front room partly covered, the tablinum, a center space

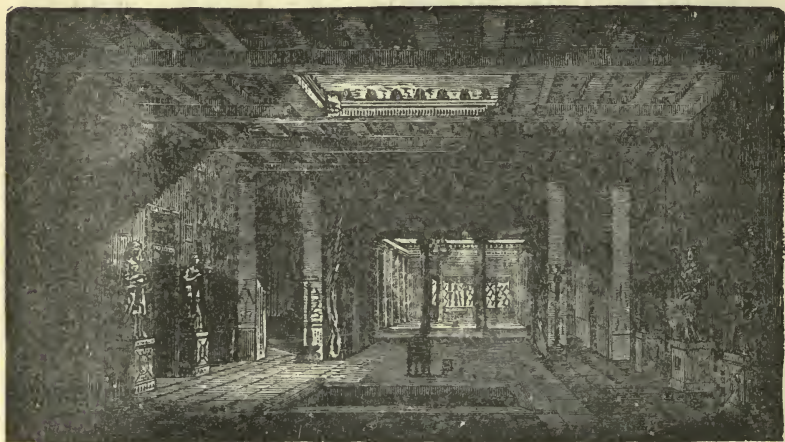


FIG. 177.—THE ATRIUM, HOUSE OF PANSA, POMPEII.

entirely covered, and peristylum, an open court surrounded by columns. The atrium was the common sitting and dining room. The uncovered space at the top allowed the smoke to escape and the rain to enter, the water being conducted to a cistern in the floor. The tablinum was

reserved for the master of the house. Here he transacted his business and kept his money and documents. This room, although it was open at both ends and lay between the atrium and the rear, was not used as a passage way, servants passing from one to the other by narrow corridors running alongside the tablinum. It is thought from some traces remaining in the ruins that the tablinum could be closed by sliding doors or curtains. At the sides of the

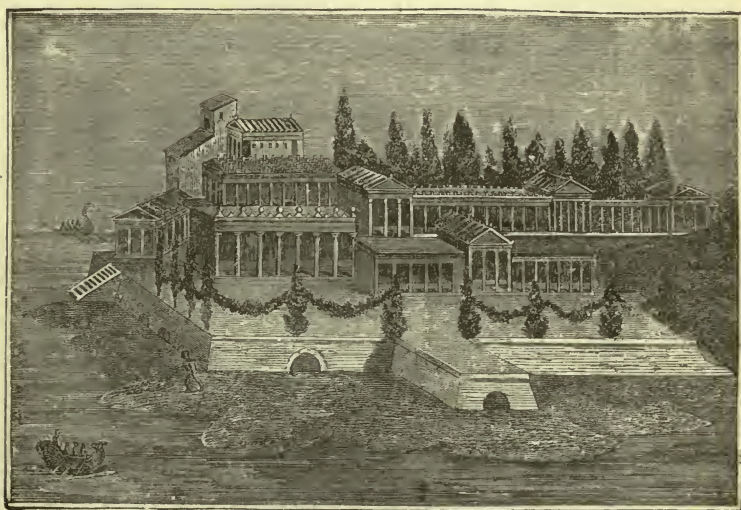


FIG. 178.—WALL PAINTING, POMPEII, "THE VILLA BY THE SEA."

atrium were usually a number of small apartments which answered as bedrooms, storerooms, etc. At the street door was the vestibulum or hallway. The house was usually only one story in height. Small stores occupied the street front on business streets.

Figure 177 represents the interior of the house of Pansa as found in the ruins of Pompeii. The main room in front is the atrium adorned with statues. The opening in the roof as well as the cistern in the floor, may be seen. Just back of the atrium may be seen the tablinum with the

corridors at the side, and in the distance the peristylum with its columns.

The rich nobles built magnificent palaces and elegant villas, or country residences. Figure 178 is a copy of a



FIG. 179.—ROME IN THE TIME OF AUGUSTUS.

wall painting found in Pompeii and representing one of these villas situated on the seashore. Some idea of the extravagance of the latter period of Roman history in the way of building houses may be gathered from the following description of the “golden house of Nero”: “The

palace was built on the Palatine, and extended from there to the Esquiline, containing all the luxuries and conveniences imaginable. A fore-court surrounded by a triple colonnade (eleven miles long) contained the statue of the emperor, 121 feet in height; ponds of the size of lakes, with rows of houses on their banks, gardens, vineyards, meadows, and woods inhabited by tame and ferocious animals, occupied the various courts; the walls were covered with gold, jewels and pearls; the ivory with which the

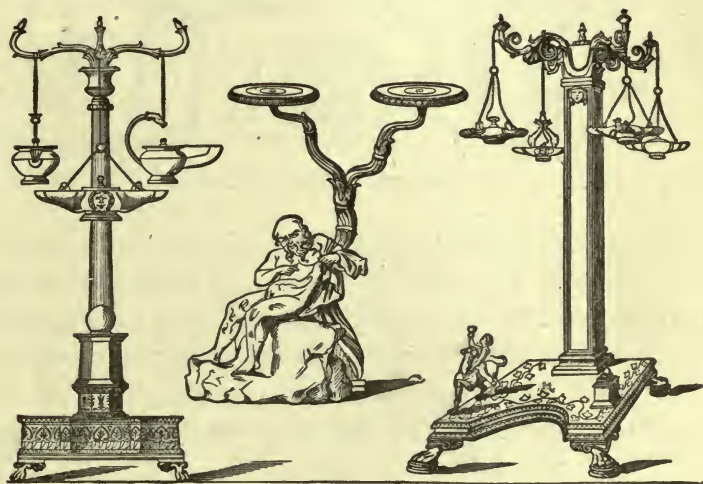


FIG. 180.—ROMAN LAMPS AND STANDS (LAMPADARIA).

ceiling of the dining-halls was inlaid was made to slide back, so as to admit a rain of roses or fragrant waters on the heads of the carousers."

Many of the houses in Rome were very high. The streets were very narrow. Carriages were not used. Persons were borne about in litters. In the later days of the Empire houses of the rich were lavishly furnished with a great variety of costly articles. The ceilings were beautifully frescoed, the floors paved in mosaic, and the halls decorated with paintings. Much of the furniture in the

houses of the Romans resembled that of the Greeks, and what has been said concerning the beds, chairs and modes of eating of the latter, will apply to the former. In the luxurious times of the latter end of the Empire immense sums were expended in furniture by the rich. Tables and



FIG. 181.—ROMAN KITCHEN UTENSILS.

lamps were especially expensive. Cicero, it is said, paid a sum equal to \$50,000 for a table. The lamps, though of beautiful designs and costly material, had no chimneys or globes, and smoked badly. Seneca had fifty costly tables.

A great variety of kitchen utensils were found at Pompeii. Some of these are represented in accompany-



FIG. 182.—ROMAN KEYS.

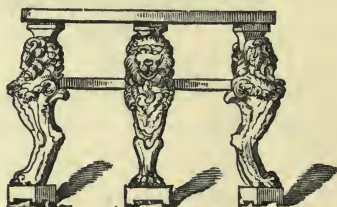


FIG. 183.—ROMAN TABLE.

ing cuts. Many utensils for the kitchen and vessels for the table were made of solid silver. Figure 182 shows some of the peculiar forms of keys used. All doors turned upon pivots and not upon hinges, those in private

houses opening inward, those in temples opening outward. Knockers were sometimes used on the doors.

Mirrors of glass were unknown to the Romans, but they had costly mirrors made by polishing plates of metal, as bronze, silver and gold. The ladies took great pains to improve their personal appearance; at night the face was covered with a mixture of dough and ass's milk



FIG. 134.—HEAD DRESS OF ROMAN LADIES.

to improve their complexion. Sometimes they bathed the face several times a day in ass' milk. Artificial teeth were made of ivory, fastened by gold wire. Much time was spent in the bath.

Jewelry was much worn by both sexes among the wealthy. Every Roman of rank wore a signet ring on the little finger. With this he affixed his private seal upon letters and documents. As an instance of the extravagant indulgence in jewelry, we read of a fop who had two sets of rings, a heavy set for winter, and a lighter set for summer, his constitution being too delicate to bear the weight of so much heavy jewelry in summer. A gold chain five and a half feet in length, to which was attached by means of rings, fifty different articles in miniature, such as scissors, keys, saws, tongs, hammers, etc., was found.

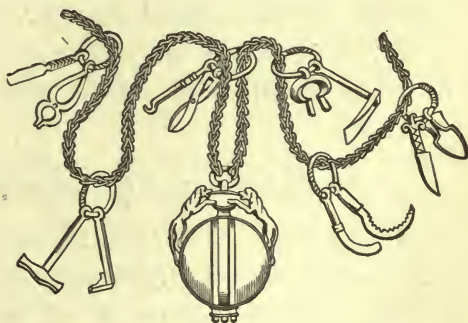


FIG. 135.—ROMAN NECK CHAIN OF PURE GOLD, 5½ FEET LONG, CONTAINING FIFTY INSTRUMENTS.

A gold chain five and a half feet in length, to which was attached by means of rings, fifty different articles in miniature, such as scissors, keys, saws, tongs, hammers, etc., was found.

In order to have fresh fish at all times, the wealthy Romans had large fish ponds supplied with fresh or salt water. The orator Hortensius, according to Pliny, had a celebrated fish pond in which he kept rare fish; when one of his favorite fish died he shed tears. Antonia, the wife of Drusus, adorned a favorite fish with earrings. Oysters and snails were also bred, and a great number of species of birds were kept in inclosures to be used in



FIG. 186.—SOLID SILVER VASES, ROMAN.

gratifying the fastidious appetite. There was, during the corrupt period, a great rage for rare and costly articles of food. One of the emperors served a dish of the tongues of 1,500 flamingoes. Peacocks' tongues were a favorite rare dish.

HOME LIFE OF THE CHINESE AND JAPANESE.

It is common to describe the life and customs of the Chinese as diametrically opposed to our own. The following from Wingrove Cook is frequently quoted. He describes China as a country "where the roses have no fragrance, and women no petticoats; where the laborer has no Sabbath, and the magistrate no sense of honor; where the needle points to the south, and the sign of being puzzled is to scratch the antipodes of the head; where the place of honor is on the left hand, and the seat

of the intellect is in the stomach ; where to take off the hat is an insolent gesture, and to wear white garments is to put yourself in mourning."

Many of the customs and habits of the Chinese have been given in the chapters on Customs and National Traits. I can therefore, if I would avoid repetition, discuss here but few peculiarities connected with their home life.

The position of women in China is a very inferior one. The birth of a daughter is often considered a misfortune. A young girl is kept shut up in her father's house, taking her meals alone, and in all respects is treated as a servant. She is given or sold in marriage without being consulted, not even knowing her husband's name. She is the property of either her father, her brother, or her husband. Some of the wealthy Chinese keep their wives shut up in close apartments, occasionally allowing them to go out to visit their parents, but always in tightly closed vehicles so that no one may see them. Polygamy is practiced to some extent.

The Chinese often carry fans, parasols, snuff-boxes, tobacco-pouches, spectacle cases and purses, all hanging by silk strings to the belt which girds their waists. They are particularly noted for their constant use of the fan. They would not think of going anywhere without one. The rich carry theirs in a beautifully decorated case which they attach to the girdle, the poor content themselves with sticking theirs between the collar of their coat and the back of the neck. Sometimes they use them to keep off the sun as one would use a parasol. The schoolmaster uses his fan to rap the knuckles of his pupils by way of punishment ; whenever their hands are not engaged in something else, they use the fan. Soldiers in the midst of a battle have been seen to stop and fan themselves.

The wealthy give themselves up to luxurious idleness, and spend much of their time secluded in their chambers where it is almost impossible for a foreigner to procure admission, so reserved are they concerning their domestic life. They consider it ill-bred to take bodily exercise.

The masses, however, are very industrious, and display great ingenuity in many of the manufacturing arts. Agriculture is brought to a high state of perfection. Their food is mostly vegetable; very little beef is used because grazing fields are scarce, the greater part of the land being tilled. Great numbers of ducks, chickens and pigs are raised. The rivers and smaller streams abound in fish. They have many ingenious ways of catching them. There is a bird called the cormorant, which they train to catch fish. The bird dives for the fish, and is prevented from swallowing it by a metal ring which encircles his neck.

Living is cheap in China; the meals for a whole family may be cooked with a few handfuls of dried grass which costs but a penny a pound. Fire is little used except for cooking; in the southern part of the empire, when the weather gets cold, they put on extra garments.

The following description of a Chinese palace will give some idea of the arrangements of the houses of the wealthier classes: "The principal room on the ground floor opens on to the ground; a piece of open trellis-work separates it from the sleeping apartment. The ground floor also comprises the dining-room, the kitchen, and sometimes a bathroom. When there is a second story it contains bed and lumber-rooms. The entrance hall is invariably sacred to the ancestors and to the guardian spirits of the family. In every room the *kang*, which serves as a bed, a sofa, or a chair, and thick mats, laid upon the floor, are to be met with. The actual furniture is scanty, a few

chairs and stools made of hard wood, with cushions placed on them; a small table made of red lacquer-work; an incense burner; some gilt or enameled bronze candlesticks; flower-stands and baskets of flowers; some pictures drawn on rice paper; and finally, the inevitable tablet inscribed with some moral apothegm, or a dedication to the ancestors of the master of the house. There are no regular windows; a few square openings, pierced in the side wall where the rooms open on a court or garden, or inserted beneath the double beams supporting the roof where



FIG. 187.—JAPANESE RESTING.

the apartment might be overlooked from the street or from the neighboring houses, allow a dim light to penetrate through the cross laths of their wooden lattices which serve as fixed blinds to them."

A great many families live in boats, which, like so many floating houses, lie anchored in the rivers near the large towns. Here many are born, live and die without ever setting foot on shore. Here they earn their daily bread by many of the various occupations which employ those living on the land.

The Japanese do not differ widely from the Chinese in their domestic life. It is said that chairs and stools are never found in a Japanese house. Mats or cushions are used instead. The engraving represents the manner in which a Japanese rests himself. Like the Chinese, they are fond of carrying fans. The Japanese soldier carries a fan with an iron sheath, which he sometimes uses in lieu of a sword or club.

The Japanese do not practice polygamy. They are in

many respects superior to the Chinese. They have a love for science and art. They are skilful workers in iron and copper. The nobility only have the right to wear silk. In summer the laborers follow their callings in a state of almost complete nakedness. When entering a house they take off their shoes. They are a cleanly people, and fond of the bath. In this respect they are quite different from the Chinese.

HOME LIFE OF THE HINDOOS.

Like the Egyptians, the Hindoos have those distinctions of society called castes. The lowest caste, or Pariahs, exist in a state of deplorable degradation. As their soil and climate are capable of producing an abundance of food with little labor, as a rule the people are inclined to indolence. Their dress usually consists of a long scarf rolled round the body passing under the lower limbs, and fastened behind. The head is always covered with a turban, and it is a sign of disrespect to take it off in the presence of others. The shoes, or sandals, are taken off on entering the house. They sit upon mats or cushions, placed upon the floor. When making a visit the Hindoo does not leave until his host dismisses him by bidding him adieu. The form of dismissal is usually, "Come and see me often," or "Remember that you always will be welcome."

The food of the Hindoos is usually very simple, consisting mainly of rice, curry (a compound of vegetables), ghee (clarified butter), with sometimes eggs and milk, or fish and fruits. The large leaves of the banana are used for plates and dishes. Neither spoons, knives nor forks are used in eating. They do not spend much time at their meals. A missionary of twenty years' residence in India is authority for the statement that the total household furniture of a poor family in that country, would often not exceed *two dollars in value*.

The men and women are both extravagantly fond of jewelry. The very poorest often wear gold rings set with pearls. They wear rings in their noses and ears, and upon their fingers and toes. The arms and ankles are often decorated with bracelets of gold, silver, copper or glass. They lay claim to great politeness of manner. It is a breach of etiquette to use the left hand in bowing, eating and drinking. The left only is used in washing their bodies. It is an insult to speak to a Hindoo of his wife and daughters.

HOME LIFE OF THE TURKS AND PERSIANS.

Home life among the higher classes of Turks differs greatly from that of the other nations of Europe. Polygamy is practiced, but not to such an extent as is generally supposed, because a Turkish woman is an expensive luxury, as she does little or no work, spends a great deal of money, and each wife requires a separate apartment. It is then, only the wealthy Mussulman who can afford to keep more than one wife. Besides their legitimate wives, the great and wealthy keep a number of Circassian and Georgian slaves as concubines. These women are kept secluded in suites of rooms, called a harem. No Turkish woman allows her face to be seen on the street. It is only within their rooms that they take off the thick veils which cover their faces. While the Turkish woman is a slave, she is not a drudge. She is born to a life of idleness and luxury. Even the women of the poorer class work but little. The women of the wealthier class pass their time in making and receiving visits, talking, singing and telling stories, swinging in hammocks, smoking, sipping coffee, bathing, and walking in their gardens. Sometimes several ladies get together, and go about paying visits to persons they have never seen.

Like the Egyptians and Hindoos, the Turks have a great repugnance to killing animals. Dogs and cats are not petted, but allowed to run at will, and swarm the streets of the cities. In Constantinople, pigeons fly about in great flocks, and the nests of birds are never disturbed, even by boys.

A Turkish bath is a peculiar process. The bather is introduced into a room with a marble floor and stone walls. The room is heated by a furnace beneath, the heat being conveyed through pipes in all directions. He undresses and wraps himself in a blanket. The heated air soon causes intense perspiration to break out on the body. This is washed off with cold water, and the body rubbed with woolen cloths and smeared with soap. Then follows the operation of kneading the body. An attendant pours warm water over the bather and squeezes, pounds, pulls and twists his body in every conceivable way, and then rubs him dry and anoints him with perfumes.

The Persians resemble the Turks in many of their domestic habits. The women go veiled, and look upon themselves as inferior to the men, and irresponsible for what they do. They are absolute mistresses at home and are often passionate and violent, inflicting wounds upon their husbands' faces with their slippers, which are armed with a sharp iron point. The men spend much of their time in the bazars (shops, or markets), and in making and receiving visits. The Persians and Turks sit upon low cushions called *divans*. It is an insult to ask a Persian concerning the health of his wives.

RUSSIAN HOME LIFE.

The Russian peasants are said to be brave, hospitable and benevolent, but wanting in cleanliness, and inclined to be intemperate. A Russian village usually contains

but one street, and the houses, which are of wood, are generally all built after one pattern. The furniture consists mainly of a huge stove in the center, and a row of bunks along the wall for sleeping upon. Kitchen utensils, provisions, instruments of labor, domestic animals and the human occupants are sometimes mingled in one room in the strangest disorder. Their houses are badly ventilated and usually overheated.

As their summers are very short (although sometimes very hot), they do not think of providing light clothing for summer wear, but may be seen often sweltering under furs or thick woolen clothes in warm weather. The men generally wear long woolen coats which reach nearly to the ground, and are girt about the waist with a belt.

The Russians are very fond of the vapor bath. Bathing houses are found in every village. The bath-room is a small apartment built of wood with benches on which the bathers lie in a nude state. Water is thrown on heated stoves, causing a dense, hot

vapor to fill the room. This soon causes great perspiration. Sometimes the temperature is raised to 140° F. After they have sweated awhile, cold water is poured on them, and the skin is rubbed with soap, and then with towels or brushes, and cold water again dashed over them. Sometimes the bathers will rush from the steam-heated room, and plunge into a stream of cold water, or roll in the snow.

A peculiar feature of Russian home life is the occurrence of villages devoted to a particular branch of trade. "Each village, each district, and each province has some



FIG. 188.—A RUSSIAN BEAUTY.

special occupation, to which often its people are exclusively devoted." Thus one province is noted for the manufacture of axes, in another the inhabitants all engage in cutting and shipping wood for fuel, in another, they are all market-gardeners and fruit-growers.

In some parts of the empire the people all live in villages or towns, there being no solitary dwellings. Among the people of wealth and the nobility, there is of course much leisure time, and much of it is spent in card-playing, and attending balls and banquets. Card-playing seems to be the most fashionable amusement. The poorer classes have but little leisure, most of their time being occupied in the struggle for existence. As in many of the countries of Europe, much of the buying and selling is done at fairs, where the people for miles around assemble, and buying and selling is the order of the day. These occasions relieve the monotony of the daily life of the lower classes.

While the Russians are not a barbarous people, yet they are not thoroughly civilized, hence the splendor and pomp exhibited by the nobility and the royal families. Their palaces and temples are gorgeous structures, almost literally covered with gold. The palace of the czar has 5,000 inhabitants, consisting mainly of servants who have servants again to wait upon them, and all with their families, find food and lodgment in the same building. This palace is not only the most magnificently decorated, but contains more dependents than any other in the world.

Not many years ago the peasants were all serfs, or slaves, not exactly like ordinary slaves, for they belonged to the land on which they lived, and could not be sold only as the land changed proprietors. Since the emperor gave them their freedom their condition has slowly improved. A laborer gets 40 cents a day for his work, and a mechanic

80 cents, and they pay from 8 to 12 cents a pound for beef, and other articles in proportion. - Cabbage soup with black bread generally made of rye, and meat in rather limited quantities, constitutes the principal food of the lower classes. When a person calls at a house for either business or pleasure he is expected to take off his overcoat. This, says Prime, is "a custom that I never noticed elsewhere."

Girls in Russia, among the wealthy classes, are kept closely under the eye of their mothers, and are allowed no liberties until they are married. Then they may indulge in gayeties and dissipation. For this reason they are very anxious to marry. "Almost as soon as a girl is born, in the better ranks of society, her parents begin to prepare the dowry she must have when she goes to her husband. For this is indispensable in the eyes of any Russian young gentleman who proposes to be married. She must furnish everything for an outfit in life, even to a dozen new shirts for her coming husband."

The ladies make free use of cosmetics for their complexion, and it is a common thing for a young gentleman to make a lady a present of a box of paint for her face.

GERMAN HOME LIFE.

The early inhabitants of Germany had no cities, or towns. They dwelt in log houses which were surrounded by stockades, which inclosed also the horses and cattle. The accompanying engraving is a correct representation of their huts two thousand years ago. It is from a bas-relief on the column of Trajan at Rome. This column was erected by men who were familiar with German life. The Germans cultivated rye, barley and flax. The women manufactured linen from the flax for garments. The men dressed themselves in furs or leather.

Says Bayard Taylor: "The three principal vices of the Germans were indolence, drunkenness, and love of gaming. Although always ready for the toils and dangers of war, they disliked to work at home. When the men assembled at night, and the great ox-horns, filled with mead and beer, were passed from one to another, they rarely ceased until all were intoxicated; and when the passion for gaming came upon them, they would often stake their dearest possessions even their own freedom,



FIG. 189.—HUTS OF ANCIENT GERMANS.

on a throw of the dice. The women were never present on these occasions; they ruled and regulated their households with undisputed sway. They were considered the equals of the men, and exhibited no less energy and courage. They were supposed to possess the gifts of prophecy, and always accompanied the men to battle, where they took care of the wounded, and stimulated the warriors by their shouts and songs."

They held the marriage relation in higher esteem than any other people of ancient times. Death was the punishment for unfaithfulness to the marriage vow.

The engraving represents a German farmhouse of the Middle Ages. It will convey some idea of the homes of the common people of Northern and Central Europe at that time. The thatched roof similar to the one represented here may yet be seen in many parts of Europe. The birds, which seem to be making themselves at home on the roof, are storks. It is a very common



FIG. 190.—GERMAN FARM-HOUSE OF THE MIDDLE AGES.

practice in many parts of Europe, especially in Holland, to place boxes on the tops of houses for the storks to build their nests in, and it is considered lucky for the household if the storks occupy them.

The home life in Germany to-day does not differ greatly from that of other civilized countries in the same latitude. The principal points of difference between the

daily life of modern Germans and our own, as noticed by travelers, are those regarding the condition of women, the drinking and smoking habits, the cost of living, and the remuneration for labor. The dwellings, furniture and food of all classes are pretty much the same as those of people of corresponding wealth in this country.

The traveler in Germany will notice among the laboring classes, women everywhere doing the work of men. They hoe in the fields, sow the seeds, reap the grain, thresh it, and haul it to mill or to market. They may be seen carrying loads of brick or mortar for the builders, working in factories, sawing or splitting wood, in fact, doing any labor and drudgery that man does, except serving as soldiers.

This is certainly a blot on the fair name of the German people, and does not sound well alongside of the fact that the ancient Germans had more respect for women than any other people of their age. These laboring women are remarkable for their physical strength and endurance. They do as much work as men, and yet do not get the same pay. Women, when they board themselves, get from 20 to 30 cents per day for work in the fields, while men for the same labor get from 40 to 50 cents per day. Women who work in the house as domestics get only their board and the cast-off clothes of their mistresses.

Remuneration for all kinds of services is small compared with the price of living. The necessities of life cost about as much in Germany to-day as they do in the United States, and the wages for all kinds of service are proportional to those given above. A physician in Germany never makes any charges, the patient keeping an account of all the visits and paying him a sum fixed by custom for each visit, and as much more as his wealth or disposition will permit.

Although the Germans are a nation of beer drinkers and smokers, intemperance is not a great national vice as it is with us. They drink their beer as they perform their work, deliberately. All classes spend much time in the beer gardens or restaurants, where they drink beer and smoke, the older persons chatting and watching the sports of the younger. Dancing and card playing are favorite amusements. They are fond of music, and are the best musicians in the world.

The houses of the masses of the people are as a rule plain and uninviting, both inside and out, though substantially built. The women spend too much time in the fields, gardens and shops, to be able to think much about decorating and keeping a home neat and cosy. The houses of the higher classes, while often large and costly, lack that richness of appearance which we see in the homes of wealthy Americans. Carpets are not so frequently seen in houses as in this country. The people are fond of telling stories, and the old legends, of which they have a great number, are kept alive from generation to generation by repetition around the fireside.

Their tables are noted for soups, boiled vegetables, sausages, and salads. Coffee, beer and wine are used as beverages at the table. Tea is but little used.

THE HOMES OF THE FRENCH.

The early inhabitants of France differed but little in their home-life from the ancient Germans. Neither do we find any very marked difference between the modern inhabitants of these two representative nations of Europe. The traveler from America will observe greater contrasts in the lower walks of life in any country of Europe when compared with his own land than he will among the more wealthy classes. He will find a large majority of the la-

boring class in France living, as a rule, in small, mean huts, such as are inhabited in this country by the very poorest people. He will see rooms destitute of carpets, and with a small amount of furniture, and but little attempt at decoration. He will find their food plain and simple, consisting mostly of vegetables and soups. He will see rude tools and few devices for lessening agricultural labor. He will find in the cities a vast amount of degradation and suffering.

On the other hand, let him go among the wealthy and noble and he will see elegant houses, decorated with the most expensive art, and the inmates surrounded by every luxury which wealth can afford, art can furnish, or taste can select. He will find the most polished and polite people in the world. As Paris leads the fashions of the world, one would not expect to find modes of dress, styles of architecture, or table manners differing greatly from what may be observed in our large cities, or, in fact, among the upper classes in any nation claiming a place in the front rank of civilization.

The French are said to stand at the head in the art of cooking. They know not only how to make food palatable, but how to economize in the kitchen. It has been said that a French family can live well upon what many an American family wastes. Soups and various preparations of vegetables are characteristic of French cookery. An amusing story is told of an American who went to a French hotel, and not being able to understand a word of their language, pointed to the first item on the bill of fare, indicating by signs that he desired some of that article. The waiter brought him soup. Having eaten that, he ran down the bill to the third or fourth article, hoping to get a change, and called again; the waiter brought another kind of soup. Then he tried another time at random with

a similar result, and finally in despair pointed to the last item on the bill, which to his disgust turned out to be toothpicks.

The French women of the middle classes seem to be special adepts in the art of making rooms attractive with the smallest amount of material. In the cities a great many families live in one large building, each with one or two very small rooms, to which they manage to give an air of neatness and cosiness, by carefully concealing all objects which are not in themselves attractive to the eye.

Like the Germans and Italians, the French spend much of their time out of doors. The public parks and outdoor resorts in the cities are always thronged with people, men, women and children, whenever the weather is at all favorable.

The French people have not so much of that foolish pride of wishing to be thought as rich as their neighbors. They do not despise economy, and are frank and open in regard to their domestic affairs, having few secrets concerning their daily life.

HOME LIFE IN ITALY AND SPAIN.

Travelers in these countries have much to say of the works of art, of the splendid palaces, of the mental and moral condition of the people, of the costumes, of the delightful climate, of the amusements, and of the character of the people, but I have yet to find a traveler who delineates in detail the interior of the houses of all classes, and speaks definitely of the daily home life and household manners of the people.

A large portion of the people of Italy live in miserable huts, with only a sack of straw for a bed, their principal food maize or black bread, heavy and sour, with a thin soup of rice and vegetables. Animal food is but little used.

All this is true, notwithstanding the fact that the climate is mild, and food cheap. In many parts of the country organized bands of robbers called bandits, abound. They make their living by robbing the unfortunate traveler on the public highways.

The Spanish peasants get very small wages for their labor, but the means of living are correspondingly cheap, and they seem to be contented and happy. Their wants are few, and they have no desire for new things. They dress in the same way and perform their work with the same kind of tools their ancestors did hundreds of years ago. The great national sport, bull-fighting, is largely patronized by all classes. The women seem to take special delight in these entertainments.

The Spanish peasantry are said to have great respect and veneration for their parents after they are aged, and the children grown and married. The children sometimes quarrel among themselves for the privilege of keeping their aged parents. This is a trait some of our own people would do well to acquire.

Many customs peculiar to the oriental, or Eastern nations were brought to Spain by the Moors, and are still retained. For example, many houses are built with an open court in the center, and with flat roofs, upon which the people pass much of their time. In some parts, the oriental custom of reclining at table and eating with the fingers, is still in vogue.

HOME LIFE IN ENGLAND, SCOTLAND AND IRELAND.

The English, of all the nations of the world, come the nearest in their home life and social customs to our own people, yet the close observer will note many differences between their homes and ours. It will be impossible to enter into detail here; I have only space to point out a

few contrasts and peculiarities. No writer has so fully portrayed the home life of the English people of the middle and lower classes as Charles Dickens. I would recommend a perusal of Dickens's novels, because they are not only delightful fictions, but true pictures of the everyday life of the masses of the English people.

To the eye of the traveler as he glides over their well-constructed railroads, or traverses their solid thoroughfares, perhaps no country appears more beautiful than England. The whole island is one great garden; almost every foot of soil is cultivated to the highest degree. Elegant country homes, adorned with all that wealth and art and taste can produce, may be seen on every hand. Beautiful grounds where the skill and taste of the ornamental gardener has been expended almost for centuries, may be seen on all sides, yet a closer observation will reveal the fact that "ne'er was palace made but the wretched hovel sprang beneath its shade." There is a great gap between the gentleman's mansion and the home of the day laborer. In the cities many are crowded together in large tenement houses, and suffering and want and misery are on every hand. It is no uncommon thing in the cities to see as many as fourteen persons of both sexes living, eating and sleeping, in one small room, the only beds a little straw on the floor, the same clothes worn at night as are worn in the daytime.

In the rural districts a better condition exists, yet one may see many a house with one room, naked walls, bare floors, perhaps of clay, a simple fire-place with a few pots and pans, and some rude tables and chairs. The land is mostly owned in large tracts by a few wealthy men who live in ease upon the rents paid by the toiling masses.

The Englishman of wealth, or gentleman, as he is called, spends his time variously. Some of them are

what Carlyle calls the "unworking aristocracy." They are fond of fox-hunting, racing, gambling, angling, or hunting small game. They make frequent visits to London, and spend their time in a ceaseless round of amusements. Others occupy themselves in landscape gardening and scientific farming. Some devote their lives to the study of some branch of natural science. Some of the great scientific investigators of the world, and most profound thinkers belong to the English aristocracy, or upper class, who are not obliged to toil with either head or hand for a livelihood.

The English are fond of good living, and remain long at the table. A professional man in America will write on his office slate, "Gone to dinner—back in fifteen minutes," but English gentlemen will spend an hour or two over their roast beef, or mutton-chops and wine.

Thousands of people are born, and grow to old age, never seeing outside of the city of London. People as a rule do not travel about much. In consequence, among the uneducated lower classes, different dialects become established in different neighborhoods, and as a result, the people of one county can scarcely understand the people of an adjoining county.

In Wales a large percentage of the population are engaged in the coal mines. Here, and in England, miners sometimes live in the mines, and children are born and grow up without seeing the light of day. Many of the people of Wales are extremely poor. Hundreds of houses formed of a few loose fragments of rock and shale piled together without mortar, may be seen. These miserable huts often have no windows, and the floors are of beaten earth, while the furniture is in keeping with the surroundings.

In Scotland there is not the vast difference between

the upper and lower classes which we see in England. A recent writer describes Scotland as "a country in which the scenes of Burns's 'Cotters' Saturday Night' are repeated in thousands of homes." The same writer describes Ireland as "a country where all is for the few, and nothing for the many; where the poor starve, while a few nobles and rich landlords can spend their substance in riotous living." All that I have said about the differences between the home life of the upper and lower classes in England may be repeated with greater emphasis in regard to Ireland. Here one will find perhaps more unhappy homes than in any other portion of the globe. The people are literally under the yoke of merciless oppressions, and there seems to be no hope for them. Is it any wonder so many Irish emigrate to America?

AMERICAN HOMES.

No country in the world can boast of more real homes than our own. While we have a few tramps going through the country, and some homeless wanderers in our cities, yet the proportion of this class is very small, compared with the nations of Europe. One would be obliged to travel many miles in this country to see as many miserable huts as he might see in a single county in Ireland or Wales. We have comparatively few houses without carpets, or books, or pictures. Even in the hastily-constructed shanty of the new settler in the West, one may see the newspaper, a table with books, a carpet on the floor, and pictures on the walls.

In New England one will yet see some of the old style houses. At Duxbury, Mass., there still stands the house built in 1666 by the son of Miles Standish, so noted in the early history of our country. Although the original furniture has long since disappeared, one may form

some idea of the home life of our Pilgrim forefathers. A capacious fire-place still stands with its iron crane, on which hung the pots and kettles. The battened doors with wooden latches lifted from the outside by a string passing through a hole just above, may yet be seen. The house is built substantially of heavy timber, enough of material to build two modern houses of the same size. We can imagine the furniture and other belongings, for relics have been preserved, and pictures and history tell us much concerning these things. There were then but few books, no newspapers, no telegraphs nor railroads. Even almanacs were not in use at that date, but in many houses there hung a list of rules or maxims, as follows :

THE TWELVE GOOD RULES.

Profane no Divine ordinances.

Touch no State matters.

Urge no healths.

Pick no quarrels.

Encourage no vice.

Repeat no grievances

Reveal no secrets.

Maintain no ill opinions.

Make no comparisons.

Keep no bad company.

Make no long meals.

Lay no wagers.

There is preserved an inventory of Standish's household goods made at the time of his death. It is as follows: "Three muskets, four carbines, two small guns, one fowling-piece, a sword, a cutlass, and three belts; four bedsteads, one settle bed, five feather-beds, three bolsters, three pillows, two blankets, one coverlet, four pairs of sheets, one pair of fine sheets and four napkins, one table and tablecloth, another table, one form chair, and four rugs, four iron pots, three brass kettles, a frying-pan, a skillet, a kneading-trough, two pails, one dozen trenchers, or wooden plates, one bowl, and a churn, two spinning wheels, one pair of steelyards, a warming-pan, three beer casks, and a malt mill and personal apparel to the value of ten pounds."

This will give us some idea of a house in those times, not only in this country but in England, as our Puritan fathers followed the same mode of life they had lived in their own country.

SOME STRANGE DWELLINGS.

The Ahts of Vancouver's Island construct dwellings, part of which they move from place to place. At certain



FIG. 191.—ESKIMO VILLAGE.

places they have stout frameworks erected, which are immovable. Then, when they wish to occupy a house, they construct movable roofs, and sides from boards, and when from any cause they wish to move, they carry the roof and sides with them to be placed upon a framework at some other spot.

The Bechuanas and Kaffirs of Africa always build

their houses in a circular form. The inclosures for their cattle are also circular. It is said that they can not make a straight fence or wall.

The Eskimos also build circular houses, as shown in the engraving. The winter dwellings of the Eskimos are made of ice or snow cut into blocks and built in a dome-like form, sometimes with a long covered entrance so low that the occupant must creep upon his hands and knees, and so narrow that but one can pass through at a

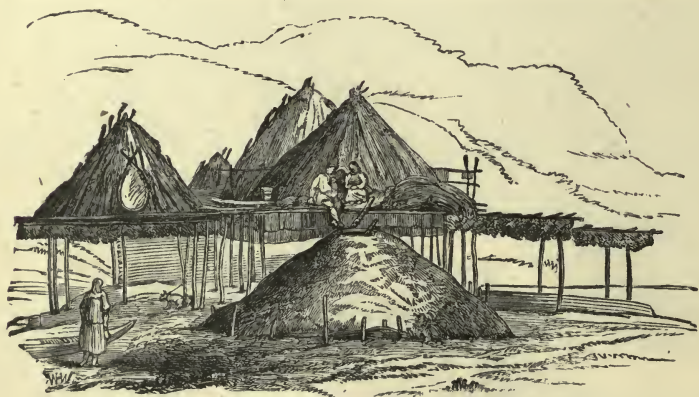


FIG. 192.—SUMMER AND WINTER DWELLINGS, KAMCHATKA.

time. These ice huts are very warm, so that the inmates sometimes throw off the whole of their clothing.

They make no fire in their huts, but keep a huge lamp burning all the time. This lamp is a simple contrivance, being only a stone dish with a wick of moss arranged around its edge, and kept full of oil. In the summer they prefer a hut of deer-skins thrown over a few sticks.

The Walla-walla Indians of the Columbia dig a hole in the ground ten or twelve feet deep and about fourteen feet in diameter, then cover it with timber and mud. A hole is left for a door, and a notched pole in the center

answers for a ladder. In this cellar twelve or more persons spend the winter, requiring but little fire.

The North American Indians lived during the winter usually in wigwams, which were constructed simply by leaning a few poles together in the form of a cone, and tying them at the top, covering the whole with skins. A fire was built on the ground in the center, the smoke escaping at the top. These dwellings were warm and comfortable. Sometimes their huts were made of bark.

In Siberia a house is built by digging a hole in the ground, covering it with timber and grass, and thus with the earth leaving an opening on the south side for an entrance, and one on the east, which is closed with a plate of ice for a window. The summer and winter dwellings of the natives of Kamschatka are shown in the engraving.

In Mexico and the southwestern part of the United States, houses are built of adobe, or sun-baked bricks, and in Nebraska and Kansas, where timber is scarce, comfortable houses are sometimes made of sods cut from the prairie soil.

THE TREE DWELLERS.

Perhaps the most singular habitations are those of the Guaranis, a tribe described by Humboldt as inhabiting the forests along the Orinoco River, in South America. During a great part of the year their country is deeply flooded by the overflow of the rivers. In the dry season the people construct their houses, not upon the ground, but high up in the trees above the highest water mark. The trees are a species of palm, which not only yields them an abundance of food, but affords an excellent support for their houses. The trees are notched and beams are fastened from tree to tree, and upon this scaffolding their huts are erected. The floors are covered with a plaster-

ing of mud, on which fires are built for cooking their food, and keeping off mosquitoes. As the climate is always warm, they do not inclose the sides of their houses, but need only a good roof to keep off the rain and protect them from the burning sun. The early explorers of the Orinoco were astonished at seeing, from a distance, fires apparently suspended in the tree-tops, but closer inspection revealed the queer habitations of the Guaranis.

When the early Spanish navigators arrived at the entrance of Lake Maricaibo, in Venezuela, they were amazed at finding whole villages apparently floating upon the water. Nearer approach showed them to be built upon piles driven into the mud in the bottom of the lake. Hence they named the country Venezuela, or Little Venice, because of the resemblance to the city of Venice. Some of these lake dwellings remain to the present day. The reader will connect the fact with the account of the prehistoric lake villages of Switzerland, described in a former chapter.

The Bushmen wish only a shelter from the rain, and if they can find a cave or overhanging rock that will shelter them, they build no house. But if there be no such natural shelter, they select a place where several small trees or bushes grow near together, and then weaving the branches together, and covering them with grass, form a roof which keeps off the rain. Then scraping away the dirt to a slight depth, they line the excavation with dry grass, and in this nest several of them sleep coiled up like so many kittens. This is based upon the authority of Capt. Mayne Reid. He says, however, that some Bushmen construct more elaborate dwellings.

The Amazon Indians construct a dwelling large enough for a hundred or more persons, in fact, all the members of one tribe, or all that live in one neighborhood. These

communal dwellings are not uncommon among savage people. Some tribes of North American Indians built long sheds of bark, in which a hundred or more of them found shelter. The Pueblo Indians of New Mexico construct large dwellings capable of accommodating an entire village. As a curious commentary on the oneness of human nature it may be remarked that the modern *French flat*, containing several families, is little more than an elegant *Pueblo*.

The Monbottoes of Africa will not sit on the ground, but have benches which the women are compelled to carry along when they go on a journey. The women sit on one legged stools. The Bongoes, another African tribe, have stools for the women, but the men consider it effeminate to sit on anything but the ground.



CAVALIER, 1350.

CHAPTER XII.

PROGRESS OF CIVILIZATION.

Whatever tends to increase our permanent bodily comfort, either in the way of food, clothing or shelter; to relieve the pains of accident and disease, and to restore health when it is impaired; to satisfy healthful and legitimate longings of the mind, whether they be the ambition to excel in art, the desire to discover hidden truths of nature, or the mere desire for amusement; to allay superstitious fears; to promote the love of humanity; to elevate the spiritual or religious faculty above mere blind superstition and direct the soul to grander and loftier conceptions,—I say, whatever tends to accomplish these ends may be regarded as agents in widening the breach which certainly exists between the highest and lowest races of men. We may call this highest condition of man, civilization, the lowest savagery, or barbarism. But, since there are all grades between the lowest and the highest we can draw no line of demarkation, and the term civilization is therefore, a relative one.

The people of China are civilized as compared with the Bushmen, because they are vastly elevated above them in many qualities which tend to produce the highest conceivable condition of man, yet when compared with the European or Anglo-American, they are uncivilized, because far below the latter in these same qualities. When we speak of the civilization of the lowest tribes of men,

we mean their condition as compared with tribes or races higher in the scale. In the sense then, in which I have used the term, it means simply condition or place in a scale graded according to a standard. But the term is often used differently. In the language of Guizot, "Civilization may be taken to signify merely the multiplication of artificial wants, and of the means and refinements of physical enjoyment. It may also be taken to imply both a state of physical well-being, and a state of superior intellectual and moral culture. It is only in the former sense that it can be alleged that civilization is an evil."

The word usually however, has the relative significance, and indicates degrees in development, but sometimes it is used to indicate kind of development. Thus we say, sometimes, that the civilization of China and Japan is peculiar, being so different in kind from ours, meaning simply that their customs and manners are so different from ours.

THE ORIGIN OF CIVILIZATION.

What is the origin of civilization? Did man begin as a savage, and gradually ascend in the scale, or did he begin as a perfect man, fall from his exalted condition to the level of the savage state, and in some cases develop again to the state we find him now, and in other cases remain in the condition of savagery to the present day? Or, was he created a perfect man morally, intellectually and physically, and when he sinned, lost suddenly his moral qualities, which had to be gradually brought back until they approximated the original innocent condition, and only in certain cases lost his physical and intellectual powers, and was degraded until he reached the savage condition? These are questions well worthy of study.

Rawlinson says, "It seems, that so far as the voice of

history speaks at all, it is in favor of a primitive race of men, not indeed equipped with all the arts and appliances of our modern civilization, but substantially civilized, possessing language, thought, intelligence, conscious of a Divine Being, quick to form the conception of tools, and to frame them as it needed them, early developing many of the useful and elegant arts, and only sinking by degrees, and under peculiar circumstances, into the savage condition."

Dr. Whately is equally emphatic upon the same side of the question. He says: "Man has not emerged from the savage state; the progress of any community in civilization, by its own internal means, must always have begun from a condition removed from that of complete barbarism, out of which it does not appear that men ever did or can raise themselves."

On the other hand, Sir John Lubbock, after an exhaustive discussion of the subject, comes to the conclusion that "the primitive condition of man was one of utter barbarism, and that from this condition several races have independently raised themselves." This is also the opinion of many eminent men of science. Such views do not contradict Bible statements, if we accept the doctrine of Pre-Adamites. See an explanation of this doctrine in the first part of this volume.

The most important of the nations first attaining a tolerable degree of civilization were Egypt, Assyria, Chaldea, Judea, Phœnicia, Persia, India, Peru and Mexico. Some notice of the civilization of these countries has been given in the chapter on *Pre-historic Man* (Book I). I shall have occasion to refer to them in treating of the factors of civilization. Greece and Rome came into prominence a little later, and after their downfall or degradation arose the civilization of northern and central

Europe, which spread to America, where we are proud to say, it exists in the highest degree to-day.

THE CAUSES OF CIVILIZATION.

There are certain factors which, if they have not been the sole causes of a progress from the lower to the higher stages of civilization, have at least been largely instrumental in producing the change. These factors may be arranged in two classes, *physical* and *mental*. Of the physical factors the most important are climate, geographical position, food, and the influence of race. Of the mental factors, I shall mention the influence of religious ideas, of political ideas, and of social ideas. These factors, both physical and mental, depend to a certain extent upon each other, and are in many ways mutually related. The problem of the cause of civilization is one difficult of solution. The causes are complex and numerous. I hope only to be able to throw out a few hints which may be suggestive to the reader.

History, and discovered remains tell us that the first civilizations sprang up in hot climates, and also that these civilizations were not permanent. Egypt, Assyria, Mexico, Peru and India are examples. The civilizations of to-day, as of Europe and America, while not in cold climates, are in the regions called temperate, where there is a variety of climatic conditions of heat, cold, moisture and dryness.

The human energies, both physical and mental, are elevated by moderate degrees of both heat and cold, when applied alternately. On the other hand energy is lessened by great extremes of either heat or cold, or when either is long continued. Temperate climates furnish a proper alternation of heat and cold, moisture and dryness, agencies which, acting together, aid in producing the highest condi-

tion of the human organization. These agencies in extremely hot and extremely cold climates are not properly distributed so as to best serve the purposes of the human economy.

In hot climates where the soil is fertile, food is easily procured, and the wants of man are few, hence the population would rapidly increase, and wealth would accumulate. There would be a development in spite of the depressing influences of extreme heat, but it would not last, for progress depends not upon physical surroundings alone, but upon the energy of man as well. There is, as Buckle has observed, a limit to the powers of nature, but no limit to the powers of man. Civilization in temperate climates would proceed more slowly, but would be more permanent. The civilization of a hot climate would be the result simply of physical surroundings, but of a temperate climate it would be the result of both physical agencies and the energy of man stimulated by his surroundings.

The time, indeed, will come when a high civilization will be found in the hotter parts of the world, but it will be produced by more powerful factors than physical surroundings. These factors I have yet to discuss.

Another factor in civilization is geographical position. This is a complex factor, difficult to define. The proximity to large bodies of water favors a development of mankind, because commerce can under such circumstances be more easily carried on. The mingling of products, and the stimulus of the contact of man with his fellow man in barter and trade, are powerful agents in elevating his condition. Hence we find some of the greatest civilizations along the banks of great rivers, or upon borders of seas and oceans. The continent which is the most deeply and extensively indented with bays and inlets of

the ocean is the one most highly developed in most of the elements of civilization. I need not say that *Europe* is this continent. As civilization advances, however, this is no longer so great a factor. Man learns to overcome the obstacles of nature, and commerce is carried on by the aid of highways and railroads, and civilization advances without this aid.

The presence of mountains, volcanoes and other features which are calculated to inspire awe in the minds of men, and make them feel their own weakness and insignificance, serves by stimulating the imagination, and the emotional faculties at the expense of the understanding, to retard civilization, or to develop a peculiarly unstable condition. On the other hand, where the works of nature are more feeble, man acquires more confidence in himself. The stimulation of the imagination and of the emotional faculties has its peculiar effect upon the religious, social and political ideas, which we shall presently see have again their effects upon civilization.

Food undoubtedly affects the progress of civilization, and in more ways than one. First, as to the quantity of food. It is an established fact that an abundance of food tends to a rapid increase in the population. In a thickly populated country where food is cheap and abundant, wages will be low; important results follow from this. A few will get rich, while the majority will remain poor and in degradation. As examples, India and Ireland may be cited. In the former country the principal food is rice. It affords a large amount of nourishment at a comparatively low cost of production. The principal food of Ireland is the potato. No vegetable which affords so much nutriment can be produced in so great abundance upon a given area of soil. As to the quality of the food, all foods may be divided into two classes, that which

tends to build up the system, and that which is burned up in the body as fuel to supply animal heat.

The first class of foods contain more nitrogen and oxygen, the second more carbon. Now the people of hot countries do not require as much food as those of colder countries, because the second requisite of food, that is, the maintenance of animal heat, is not in so great demand. This amounts then to the same in its general effect as an abundance of food.

But there is another phase of the question of the quality of food. The most highly carbonized foods, or those necessary to maintain animal heat, come from the fat of animals. This is more difficult to obtain. Therefore the inhabitants of a colder climate must put forth more exertion, and consequently develop greater physical and mental energy. On the other hand, the food necessary to mere supply of the waste of the system is supplied with little or no labor in hot countries, in the form of fruits and grains, and as a consequence the inhabitants of hot countries are not stimulated to exertion.

Whether the differentiation of man into races is itself the result of climatic and other physical influences, or produced by a process of natural selection and a survival of the fittest, we may say that racial characteristics are factors in civilization, because characters and habits once formed, continue to have their effect upon succeeding generations. To illustrate, the greatest civilization has been among the European or Caucasian race. This race is noted for its intellectual and physical superiority, as well as for its restless and aggressive energy. Let a branch of this race be given the same physical surroundings as a branch of one of the other races, and the result in the course of time as far as rapid advancement is concerned, will be largely in its favor.

We can then say that, like a number of seeds planted in a given area, the race which first gains the ascendancy will maintain it and become a factor in producing the general result. It is then much a question as to what kind of a start is made. It is like the acquisition of wealth by individuals. Take two men of equal financial ability and with equal surroundings, and give one a hundred dollars, and the other one a thousand, and at the end of a given time the latter will have more than ten times as much as the former.

Buckle, in his great work, the "History of Civilization in England," gives some very plausible arguments to the end that religion is an effect and not a cause of civilization. But can we not say it is both an effect and a cause? The lowest tribes have a sort of religion. As they advance in knowledge and intellectual development, their religion assumes a higher grade. Now as in the case of the formation of races, may not a set of religious ideas once formed and deeply rooted affect the conduct of men for many succeeding generations? We see that the highest type of civilization is found among those people who profess a monotheistic religion. The belief in, and worship of one God, is more elevating to the mind than the worship of many gods. Christianity, because it teaches love for all mankind, is the highest type of religion. Let this doctrine be introduced among an uncivilized race, and although the people on account of mental inferiority are not fully prepared to receive it, yet its effects are soon visible in elevating their minds, and improving their physical condition. On the other hand, a religion like that of the Chinese, or of the people of India retards civilization because it lacks some of the elements which tend to elevate man in the scale. We can then say that the infusion of proper religious ideas is one of the

greatest factors in bringing about an advanced stage of civilization.

Proper ideas of government like proper religious ideas, when once grounded into the minds of the people, act as a powerful agent in advancing the condition of mankind. The Chinese people are thoroughly imbued with the idea of a parental government, the parent having absolute control over his children. This idea has led to despotism of the worst form, and a despotic government is not consistent with, nor does it tend to bring about an elevated condition of mankind. That form of government which approaches the republican, is not only the government for a highly civilized people, but republican ideas instilled among the people act as a strong factor in improving their condition.

Under the general name of social ideas may be mentioned the treatment of women and children, the habit of keeping slaves, cruel treatment of prisoners, and conduct as regards veracity and honesty in dealing, all of which, though marking stages in civilization, are nevertheless also factors either in the advancement or retardation of mankind. The same principle applies here as in the case of the influence of race, of religion, and of political ideas.

Men are, to a great degree, creatures of habit, followers of custom, and when a custom once gets established it is difficult to eradicate. Customs originate usually from the necessities, apparent or real, of surrounding circumstances. Human slavery was continued in our own enlightened country to within a recent period, and many good men argued that it was right. The fact that it had been a custom to enslave inferior races for thousands of years, was the strongest argument with them. Women are only beginning to take their proper place in social and po-

litical affairs. Customs regarding the treatment of women, which originated in barbarous ages, still influence nations.

Thus the feudal system, though an apparent necessity of the times, was a check upon progress, for it prevented individual effort, and led to oppression of the masses by a lordly few. On the other hand chivalry, which grew out of feudalism, exerted a good influence. It taught respect for women, and charity toward the poor and helpless.

Different savage tribes are to-day characterized by different customs. Their civilization, while it may be of the same degree, is not of the same kind. For example, some tribes may be noted for dishonesty and treachery, yet have a fair development of the arts, have a higher regard for women and be comparatively free from many of the vices, such as intemperance and lasciviousness. Other tribes again may be remarkable for their veracity and fair dealing, and yet possess many evil habits, be exceedingly cruel and inhuman. Now, these traits of character and customs of social life can not but variously affect future generations, and thus become agents in moulding the character of the future civilization which is to develop from them.

In the same sense, every invention of art, and every discovery in science, though results of a previous development, are yet factors concerned in producing the civilization of the future ages. What rapid strides in civilization were made when the printing press began to be used ! The invention of the mariner's compass, of the steam engine and a hundred others that might be mentioned, all had their effect upon the progress of civilization.

ORIGIN AND PROGRESS OF INVENTIONS AND DISCOVERIES.

A complete history of the progress of discovery, and the developments of inventions and improvements would

make many volumes. I shall endeavor to note some of the more important and interesting facts, mainly for the purpose of showing the vast difference between ancient and modern times.

CHIMNEYS.

It is a singular fact that, while some very ancient people attained great skill in architecture and ornament, and seemed to have been acquainted with many arts, such as working metals, engraving on stone and the like, some of the simplest contrivances which add so much to man's comfort were of comparatively modern invention.

The Greeks and Romans, the Egyptians and some other ancient people as we have elsewhere noted, built magnificent edifices, and decorated them profusely with the products of man's skill, yet we have no evidence that they had any arrangement for carrying the smoke out of their rooms, or of securing comfortable ventilation. The ruins of these buildings show no signs of chimneys, nor are there any references made to them by ancient writers. The oldest authentic account of chimneys bears the date of 1347. It is in the form of an inscription in Venice, which states that a number of chimneys were thrown down by an earthquake. Roman houses were sometimes warmed by hot air conveyed through pipes from furnaces situated beneath the building. Most of the houses, however, were without any mode of warming, except by building a fire on the ground or floor in the center of the room, the smoke escaping at a hole in the roof.

Chimneys were formerly made very wide and men or boys followed the business of cleaning them. These chimney-sweeps, as they were called, are scarcely known at the present time.

It must be remembered in this connection that the na-

tions earliest civilized were located in the warmer parts of the globe where fires were seldom needed, except for cooking purposes. From the tenth to the thirteenth cen-



FIG. 194.—WILLIAM THE CONQUEROR.

turies there seems to have been no chimneys in Europe, as shown by the fact that almost everywhere a law existed which compelled people to extinguish their fire and cover the openings in their houses at a certain hour in the evening. The time for this was announced by the ringing of a bell. This was called the curfew ("fire covering") bell. This custom was introduced into England by the Normans, under "William the Conqueror," who conquered

England, 1066 A. D. The object in compelling the conquered Saxons to extinguish their lights was to compel them to go to bed early, and thus prevent their forming plots against the Normans.

TABLE FORKS.

The use of table forks is of comparatively recent date. They were first used in Italy about the fifteenth century. Thomas Coryate, a noted traveler, having observed the Italians using forks at the table, was the first to use one in England. His friends called him by way of joke, *Furcifer*, "fork-bearer." The first use of forks was ridiculed in England as inferred from passages in

Beaumont and Fletcher's plays, and in the writings of Ben Jonson.

GLASS.

Glass was known in very ancient times, yet it seems not to have been used, at least to any extent, for any but ornamental purposes, or for small articles, as cups and bottles, until as late as the fifteenth century, when it began to come into general use for windows. Pliny, the



FIG. 195.—EGYPTIANS BLOWING GLASS 4,000 YEARS AGO.

Roman naturalist, ascribed the discovery of glâss to some Phœnician sailors. He says they built a fire on the sand, using for the purpose certain sea plants, and the ashes united with the sand producing a shining, transparent substance which was glass.

The honor of its discovery is claimed by different nations, but as the oldest specimens known are Egyptian, these people were probably the first discoverers. It was at least known to the Egyptians 4,000 years ago. Says Wilkinson, "Such was their skill in making glass, and in the mode of staining it of various hues, that they counterfeited with success the emerald, the amethyst, and other precious stones, and even arrived at an excellence in the art of introducing numerous colors into the same vase, to which our European workmen, in spite of their improvements in many branches of this manufacture, are still unable to attain. A few years ago the glass makers

of Venice made several attempts to imitate the variety of colors found in antique cups, but as the component parts were of different densities, they did not at all cool, or set, at the same rapidity, and the vase was unsound." This was written in 1853.

The Egyptians had the art of producing a pattern in glass in which the figure on the surface passed in straight lines through the substance so that when horizontal sections were made at any place, the same pattern would appear on the upper and under surfaces. This curious art has been revived only within a recent period. The de-



FIG. 196.—CYLINDER OF SENNACHERIB.

signs were sometimes so fine that they could only be made out with a magnifying glass which would be evidence of their knowledge of the microscope. That the use of the magnifying glass was known to very ancient people is proven also by the discovery of a lens of crystal at Nimroud in Assyria. The use of the microscope is also proven to be of great antiquity by the discovery of minutely engraved objects in the ruins in Assyria. The accompanying cut represents one of these minute engravings.

The Egyptians made glass bottles, and cups of various patterns. These were exported to other countries. The Greeks and Romans not only borrowed the art of working glass, but received many of their ornaments and utensils of this material from the Egyptian manufacturers.

The glass goblet shown, fig. 197, was found at Novara in Italy. It has an outer shell in the form of a network at



FIG. 197.—ROMAN GLASS GOBLET WITH TWO WALLS.

some distance from the glass proper, and connected with it by small threads of glass. The net-work is sky-blue, and the glass itself of a yellowish tint. The inscription around the top is in raised letters of a green color. It is supposed to have been imported from Egypt.

GUNPOWDER AND FIRE-ARMS.

Although it is very probable that gunpowder and fire-arms were known and used several hundred years before the Christian era, it was not until the twelfth century that they became important factors in civilization. Saltpeter, one of the necessary ingredients of gunpowder, is a natural product of China and India. The ancient Arabian historians called saltpeter "Chinese snow" and "Chinese salt." From this fact and from Chinese records, it is quite certain that an explosive compound similar if not identical with our gunpowder was known and used by the Chinese in very early times, but just when it was applied as a propellant of missiles, is not known. Chinese history records that in 618 B. C., a cannon was used, which bore the inscription, "I hurl death to the traitor, and extermination to the rebel." The great wall of China also affords evidence of the use of cannon. Certain holes in the wall seem to have been for the use of small guns. The knowledge of gunpowder and fire-arms probably extended from China and India to the west, through the Arabs.

The invention of gunpowder is often attributed to Friar Bacon. This learned man probably obtained a knowledge of it from ancient manuscripts, and introduced its use into Europe. Bertholdus Schwartz in 1320 discovered the process of granulating the material, and from that time it seems to have come rapidly into use, and a great variety of fire-arms soon followed. The first guns

were very rude affairs (see cannon of fifteenth century, page 239), but improvements have been going on from the time of Schwartz until the present. Neither breech-loaders nor revolvers are of recent invention. Some of the first guns were breech-loaders. The revolver was used in Germany in the sixteenth century. Neither is rifling a new invention. There were rifled guns in the fifteenth century. From these facts we are not to conclude that no progress has been made in this line. The first hand guns and pistols were very large and clumsy. (See cuts of early fire-arms under *Modes of Warfare*).

There is a great stride between the hand gun of the fifteenth century which had to be touched off with a match held in the hand, and have a rest in firing (this rest is used in Persia to-day), and the modern breech-loading needle gun, or the pocket revolver. The improvements consist mainly in the greater accuracy in rifling and boring, in the mechanism for rapid firing, and in the use of the fulminate or percussion lock.

Cannon were first used in Europe at the beginning of the fourteenth century. The first cannon were breech-loaders, made of bars of wrought iron hooped together. They were wider at the muzzle than at the breech, and fired balls of stone. The modern Krupp gun is made of steel, weighs seventy-two tons, has a caliber of fifteen inches, is over thirty-two feet in length, and throws a shell of chilled steel, weighing 1660 pounds, and containing a bursting charge of powder, of twenty-two pounds. The gun requires 385 pounds of powder, and is capable of throwing the projectile to the distance of fifteen miles.

The improvements in defensive warfare have also been great within late years. The battle between the Merrimac and Monitor during our late war was the most won

dertul example of man's skill in both offensive and defensive warfare known in all history.

The bayonet was invented at Bayonne, France (from whence its name), in 1650. It was first inserted into the mouth of the gun-barrel. It was not until 1689 that it was fastened to the side of the barrel.

The mitrailleuse, a machine used in recent times, and which fires a shower of balls from a great number of separate barrels, is also of ancient invention. Similar machines were used in Germany in the fifteenth century, and called "death organs." One is mentioned which had as many as thirty pipes, or barrels.

The improvements in the art of killing men, instead of increasing the destruction of life in battles, has greatly lessened it. Besides, wars are now so much sooner ended, and the total destruction of life is on the whole, much less. At the battle of Cannæ, the Romans lost 40,000 men out of an army of 80,000. At the battle of Cressy, the French lost 30,000 out of 100,000. In the Franco-Prussian war, the average of killed and wounded was only one-ninth of the numbers engaged. The invention of gunpowder reduced the mortality from one-third to one-fifth, and the invention of the modern breech-loader reduced it to one-ninth.

It is to be hoped that the time is not far distant when all national disputes will be settled by arbitration, and wars be at an end. This seems to be the tendency, the past century having witnessed some great difficulties settled without recourse to the sword.

TIME-KEEPERS.

The most ancient peoples had no idea of time, except as measured by succession of day and night. They were not long in observing the changes of the moon's face.

They could see that after a certain number of alternations of day and night, the moon assumed the same appearance. Hence the savage will speak of so many moons when referring to time past. The fact of the return of the seasons with a degree of regularity would be noticed and used as a means of measuring time. Pastoral nations who dwelt under cloudless skies would naturally study the stars, and soon the motion of the sun among the constellations would be observed. Now, they would have years, months and days as measures of time.

But as the employments of man would become more numerous and varied, he would see the necessity of shorter divisions of time. Perhaps the first means employed for measuring short periods of time was the sun dial. At least it is an instrument of very great antiquity. It is mentioned in Isaiah xxxviii : 8. To-day, sun-dials are objects more of curiosity than utility.

The first improvement upon the sun-dial as a time-keeper was the *clepsydra*, or water clock. It is supposed to have been used by the Chaldeans. The Greeks and Romans made extensive use of it. It consists of a vessel so constructed that water may flow regularly from an orifice, the amount of diminution being marked on the outside by an index, attached to a float. The hour-glass, or sand-glass, was probably a later invention. It consisted of two bulbs of glass united by a narrow neck. Sand was placed in one bulb and allowed to run through into the other, the quantity being just sufficient to pass through in an hour, or twenty-four times during the day and night. The hour-glass was employed almost universally in churches in the sixteenth century, and used to some extent until about fifty or sixty years ago.

Both the *clepsydra* and the hour-glass were very imperfect measures of time, as they were affected by changes

in the temperature and other causes, and required constant attention. King Alfred of England measured time by the shortening of burning wax-candles. To prevent the wind from blowing the flame, he surrounded them with boxes of horn scraped thin. This, it is said, led to the invention of the lantern, and gave origin to the name lantern (a corruption of "light horn"). Lanterns were, used, however, at a much earlier date, by the Greeks and Romans, and probably by the Chinese.

It is not known exactly when nor where clocks were first invented. Says Prof. Hamberger, "It is sufficiently apparent that clocks moved by wheels and weights, began certainly to be used in the monasteries in Europe, about the eleventh century, I do not, however, think that Europe is entitled to the honor of this invention; but it is rather to be ascribed to the Saracens, to whom we are indebted for most of the mathematical sciences."

It has been said that watches were invented in the sixteenth century at Nuremburg, by Peter Hele, and called from their oval shape "Nuremberg animated eggs," but there is evidence of a much earlier origin. A watch was found in Scotland with the inscription *Robertus B. Rex Scotorum*. This must mean Robert Bruce, King of Scotland, and as it is known that this king reigned from 1305 to 1328, the watch was a product of the fourteenth century. This watch had a cover over the face of transparent horn instead of glass.

It was a long time, however, before clocks and watches came into general use, probably because they were very imperfectly constructed, and did not keep time as accurately as the sun-dial or hour-glass. It was nearly a hundred years after the invention of the watch before a balance spring was used. Without this, a watch must have been a very untrustworthy machine. In the time of

Queen Elizabeth, watches were made very large, and were very imperfect as compared with ours of to-day.

As examples of the remarkable skill and ingenuity of man, it may be said that watches are made so small as to be used as sets in pins and rings. The King of Siam, it is said, has a collar button in which is a miniature watch which strikes the hours, and has an arrangement for tickling his nose to awaken him at a given time. Great accuracy has also been attained in time-keepers. Chronometers are in use which do not vary more than a second or two in a year.

MOTOR POWERS.

It may be said that the world is moved by machinery. One great difference, especially in this country, between the present time and fifty years ago, is that nearly all kinds of labor are performed by machinery. This change from hand labor to machine labor has wrought great differences in the occupations of men. Formerly, coopering, shoemaking, tanning leather, and a dozen other trades were prosecuted on a small scale in almost every town, and weaving, spinning and preparing wool and flax were common household duties. To-day almost all articles of merchandise are made on a large scale by machinery. Almost every article of food can now be bought ready prepared for use. Nearly all kinds of fruits, vegetables and meats are cooked and preserved ready to be served in a moment's notice, and may be bought at almost every corner grocery in villages, towns and cities. Nearly all articles of clothing and furniture may be bought ready made, so that the good housewife has nothing to do but order what she wants, and it is brought to her door. Since the invention of the telephone, which may be classed as a machine, the housekeeper in our cities and large

towns is not even obliged to step out of the house, or send a servant. She has only to speak, and the articles are delivered at her door.

But if machinery moves the world, there must be something to move the machinery. The muscular power of animals, as the horse, was early utilized in moving machines, but power here has its limits, and besides it is expensive, for the animal must, even when it is not employed itself, be supplied with power in the shape of food, which again requires an expenditure of muscular force to produce. The action of water falling by the force of gravity has long been known as a cheap source of power, and even to-day under certain conditions is preferable to steam. The power of steam was known to the ancients. Hero of Alexander, who lived 120 years before Christ, gave a description of a machine which was run by steam escaping from orifices in a tube with arms placed at right angles to it. In 1663 the Marquis of Worcester described a machine for raising water by the expansive force of steam. It was nearly a hundred years later, however, when James Watt constructed an available steam engine.

But the knowledge of mechanical principles previous to the sixteenth century was very meager, and it was a long time after the steam engine was invented, before machinery began to be generally adopted to perform the work of human hands. The steam engine alone then, could never have so revolutionized mechanical industry. It was the thousand and one machines, each a contrivance for applying a power to some special kind of work, which produced the change.

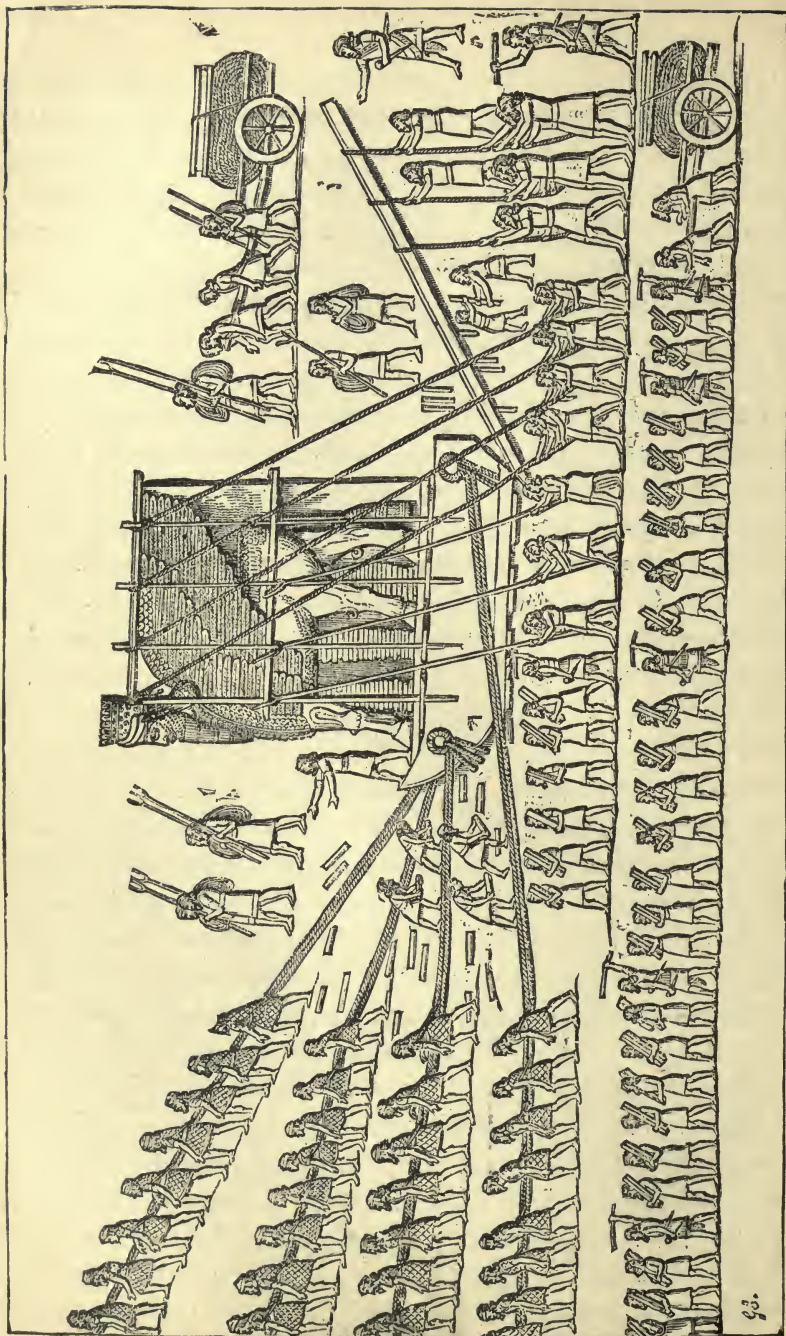
This is an age of steam, but what will be the motor power of the future? To produce steam, fuel is necessary. Is the supply of fuel inexhaustible? There is enough to last for ages, but it will not last always. The growth

of vegetation will not keep pace with the wants of man, and the time may come when the coal, which is a vegetable product stored up in the past ages, will be exhausted. Man must either contrive some way of getting more power from the same amount of fuel, or discover some new motor.

What an immense amount of power is going to waste at Niagara Falls! Could that be distributed over the country, how many machines do you think it would run? How much work could it be made to do? Of late years science has been looking toward electricity as a motor power. Already we have used it to some extent in running machinery as well as in such work as galvanizing, or electro-plating, and electro-typing. An electric railway has been, at least, a partial success. The possibilities in this line are large. Twenty-five years from now we may see a great change.

MECHANICAL APPLIANCES.

So far as written history informs us, we cannot say that the ancients had any very great knowledge of the laws of mechanics. Archimedes, the great Greek philosopher (died 212 B. C.), discovered the principle and applications of the lever, but up to the sixteenth century the science of mechanics made no advancement. But the ancient Egyptians and Assyrians must have been acquainted with many of the elements of machinery, as the erection of their great temples, pyramids and monuments could never have been accomplished otherwise. The accompanying engraving is a copy of a bas-relief of Nineveh, showing the moving of a colossal statue. Here we see the application of the lever and rollers. The men behind are raising the sled by means of a lever, a number at the side are holding the statue with guy ropes, and a number



MOVING A HUMAN-HEADED, WINGED BULL FROM A PARTIALLY RESTORED BAS-RELIEF OF NINEVEH (KOYUNLIK).

are placing small rollers under the runners of the sled. Thus with a few simple mechanical devices and a great number of men, the immense object was moved along. The ancients kept numerous slaves, and great numbers of them were employed to do work which in our day may be done by a few men with horse or steam power, and the proper mechanical appliances. The slave drivers may be seen with uplifted whips or clubs along the line of slaves.

In Wilkinson's "*Ancient Egyptians*," there is a large engraving which is a copy of a wall painting, and represents the moving of a colossal statue. There are 172 men in four rows pulling upon ropes attached to a sled upon which the statue is bound. Here there are no levers nor rollers, but a man stands on the pedestal of the statue and pours grease from a vessel to facilitate its passage, probably upon planks which are placed on the ground, although none are represented. A man stands on the knee of the statue, keeping time with his hands to the measure of a song, to insure simultaneous draught by the men at the ropes.

In ancient times the people were little better than slaves, and forced levies of men were made whenever great public works were undertaken. If the poor wretches died in the harness, others were compelled to take their places. But, notwithstanding the fact that great numbers of men were employed in moving their heavy weights and constructing their buildings, it seems incredible that such immense blocks of stone as we find could be moved by even the mechanical means known in our day. Some stones are found in their walls sixty feet long, twelve feet wide, and nine feet thick. There is a colossal statue of Rameses II which weighs 887 tons, and the quarry from which it was taken is 130 miles distant. Wilkinson says, "The immense weight of some of the blocks shows that

the Egyptians were well acquainted with mechanical powers, and the mode of applying a locomotive force with the most wonderful success ; and the use of grease for large weights, in preference to rollers, is consistent with modern experience."

The discovery of cylindrical holes in some of the blocks of stone in the pyramids has led some to suppose that they were elevated by means of a windlass, or derrick, such as builders use in our day.

ARCHITECTURE.

The history of architecture from the earliest nations to the present time has not been, like that of most other arts, one continuous line of gradual improvement. The architecture of the Egyptians in many respects surpassed that of all succeeding times. The Greeks and Romans attained great skill in this line. Their ideas were doubtless in part borrowed from the Egyptians, yet each country originated styles peculiar to itself. The arch, an important feature in all stone or brick architecture, was known to the Egyptians at least 1600 years before Christ, and perhaps much earlier. The use of bricks undoubtedly led to the invention of the arch, for so long as wood and stone were the only materials used, the arch was not an absolute necessity. The scarcity of timber, and in some parts of stone, also led to the employment of brick in architecture. The pyramids were remarkable structures. The largest is known as Cheops. It was, on the authority of Herodotus, the tomb of Cheops, an Egyptian ruler. Investigations within modern times revealed the name Cheops painted on the stones in one of

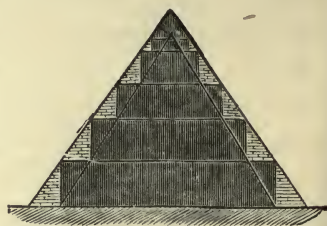


FIG. 199.—PYRAMID.

the chambers. These pyramids were built of immense blocks of stone, the outside at first in the form of steps, which were then leveled by filling up the angles from the top downward with masonry. The lighter portions in the cut (Fig. 199) show this filling. Fig. 200 shows how the arch in the interior is constructed. It is really not

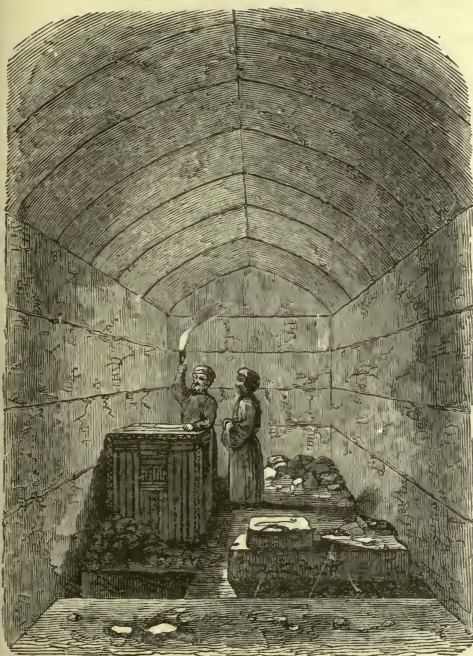


FIG. 200.—BURIAL CHAMBER IN PYRAMID, SHOWING FALSE ARCH.

a *true* arch, but is formed by "strutting" large blocks together like rafters, and trimming them to the appearance of an arch.

Some idea of the size of Cheops may be gathered from the following: The capitol at Washington covers $3\frac{1}{2}$ acres, while this pyramid covers $13\frac{1}{2}$ acres, so that four such buildings as the capitol might be placed on its foundation. It is 451 feet in height, not the highest structure

in the world, however, the Cathedral of Cologne being 512 feet. But in bulk it far exceeds any building in the world. A squirrel shot placed at the bottom of this page would be in proportion to the height of the page as a man would be to the height of this pyramid.

As evidence of the builder's knowledge of the weight and strength of his material, may be instanced the fact that a number of small chambers are constructed over the

large chamber to relieve the pressure upon the flat roof of the latter.

The temple at Karnak described in another part of this work (see illustration page 105) is another example of wonderful architectural skill. Colossal size was the great feature of Egyptian architecture. The Greek and Roman architecture was noted for its great beauty. Our modern architects have but little more than imitated the great models of the Greeks and Romans. (See illustration of a Roman temple at Nismes, page 375.)

AQUEDUCTS.

In this connection may be mentioned the great improvements made in modern times in the manner of conducting water to supply large cities. The Romans constructed aqueducts or channels of stone, which they carried over deep valleys and through hills on a level, to supply their cities with water. These aqueducts were constructed at an immense cost. Cast iron pipes, which can be made in sections, of great size and very strong, are now used for the same purpose, and a great advantage is gained, as they may follow the inequalities of the ground, the only requisite being that the fountain head be a little higher than the place of discharge.

MEANS OF TRANSPORTATION.

History does not go back to a time when domestic animals were not used to carry loads and bear their masters on their backs. When wheeled vehicles were first used is not known. The Egyptians used chariots in war 4,000 years ago, as shown by their paintings. They were without a seat, the bottom part consisting of a framework of ropes or thongs, which answered for springs. They had two wheels set well back (see illustrations pages 99 and

231) so that much of the weight was borne by the horses. The paintings show even the manner of constructing the chariots. The curved shape of the pole, by the way, has been imitated in modern times only within the present century. The pole was supported by a curved yoke which was attached to padded saddles resting on the withers of the horses, and held in place by girths and breast band. The wheels were made very much as on our modern vehicles with hub, spokes, felloes, and tire. The tire was fastened with bands of raw-hide. They had also travel-



FIG. 201.—ENGLISH CARRIAGE OF 15TH CENTURY.

ing vehicles similar to the war chariot, drawn by oxen. But one instance occurs of a four-wheeled vehicle, and it was used only for religious purposes.

Covered carriages, or coaches, were used in Rome in their public processions and triumphs. In the days of feudalism, from the eighth to the twelfth centuries, it was the universal custom in Europe for noblemen to ride upon horseback, as they thought it would make them indolent to ride in carriages. In the sixteenth century it was common for ladies of high rank to ride in covered carriages, but men generally considered it effeminate, and preferred to go on horseback.

The first coaches were clumsy affairs, and had no

springs, the driver riding one of the horses, as shown in fig. 201. When springs were first used in carriages is not known, but they were in use in the time of Louis XIV. (1697-1715). Our modern carriages and buggies are great improvements on the lumbering coaches of the seventeenth and eighteenth centuries, but in many parts of the world the same kinds of rude vehicles which were used by our ancestors may still be seen. Compare the bullock carriage (Fig. 127) as used in India with one of our modern buggies. Even in our own Southern States sleds are often used instead of wagons for conveying farm produce.

The backs of animals, as the camel, the lama, the ass, the horse, have been from the remotest times, and are to-day in some countries, common means of transporting merchandise. Caravans are great assemblages of persons which traverse the deserts of Asia and Africa at stated intervals. Some are made up simply of travelers who thus go together for protection, and others of merchants conveying merchandise. Camels are the animals used. They carry often 500 lbs. each on their backs, and travel eighteen or twenty miles per day. An extensive trade is thus carried on between Russia and China, and from Turkey to India. In England, before the general use of wheeled vehicles, goods were carried altogether by pack horses, and to-day in Spain, Mexico and South America the backs of mules are almost the only means of transportation. Before the introduction of canals and railways, goods were carried by wagons in a slow and tedious manner. Many of our old citizens can remember when railroads were few in number in this country, and of seeing trains of wagons toiling laboriously with their loads of merchandise, or have distinct recollections of long journeys made by stages. But those days are past, and it is only for short distances, or in the remote parts of the West where railroads have not

yet reached, that one sees the stage-coach or the wagon train.

Canals for the purpose of navigation were of little avail until the invention of the lock, by means of which boats could pass over irregular surfaces. The Italians and the Dutch both claim this invention. Locks were first used in the fifteenth century. By means of canals large quantities of goods could be conveyed at little cost, and wherever they were constructed the carrying by wagons was almost abandoned. In these days in this country, when prices change so frequently and the news is conveyed by telegraph almost instantaneously all over the country, canal boats are entirely too slow, and they are beginning to be abandoned as modes of conveyance, or the trade by them is limited to a few kinds of produce.

RAILROADS.

Railways were first used at the beginning of the seventeenth century. They were employed by miners in England to facilitate the transportation of coal from the mines to the places of shipment. They consisted first simply of two parallel rows of wooden beams fixed to the ground and furnished with flanges to prevent the wheels of the vehicles from slipping off. It was found that a horse could draw twice as great a load attached to a wagon on one of these tramways as on the ground. But it was nearly a hundred years before any improvement was made in these railways. The first step was to cover the wooden rails with strips of iron to prevent the rapid wear. Next was the employment of cast iron rails laid upon cross-ties of wood, and this was followed by the plan of linking together several small wagons in a train. A greater improvement, however, was when they put the flanges on the wheels instead of on the rails.

In the meantime, the steam engine had been invented, and the next great improvement was the invention of the locomotive. It was thought for a long time that a locomotive would not work unless the wheels had cogs which would run on a corresponding ratch upon the rail. The invention of the locomotive was due not to any one man, although the name of Geo. Stevenson is generally associated with the first successful locomotive and train of cars. Stevenson's locomotive made its first trip in 1814, and from that time on the improvements were rapid. Steam carriages to run on common roads were suggested as early as 1759. A Frenchman named Cugnot, in 1770 constructed a steam carriage which ran with such force as

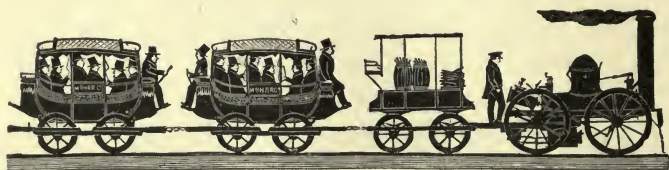


FIG. 202.—FIRST TRAIN OF CARS.

to knock down a brick wall. Between 1822 and 1841 there were a great many steam carriages invented, some of which attained a speed of twelve miles an hour on a common turnpike road. One was constructed which had the engine within a cylinder which rolled over the ground, and another which appeared to walk on iron legs. Many attempts to perfect locomotives to run on common roads have been made within recent years, but thus far inventors seem to look to their employment only for the purpose of drawing heavy loads, and not for the conveyance of passengers. It is interesting to compare the modern railway train with the first locomotive and train of cars. The first locomotive with its train of cars did not attain a speed greater than five miles an hour. Now it is not con-

sidered extraordinary for trains to run at the rate of a mile a minute.

It may be interesting to note in this connection that the first velocipedes were propelled by the rider striking his feet upon the ground. No great speed could be obtained in this way. The following time has been made by modern bicyclists: 440 yds. in 41 seconds; one mile in 2 minutes and 41³/₅ seconds; 1007 miles in 72 hours (12 hours daily.)

NAVIGATION AND COMMERCE.

The first step toward navigation was probably the raft made by fastening two or more logs together. To hollow out a log for a canoe would naturally follow. Canoes and rude boats of small size have been known from



FIG. 203.—ROMAN TURRET SHIP (BIREME).

the earliest times. The paintings of the ancient Egyptians represent vessels made of planks, and with sails and oars. It is believed that they navigated the Mediterranean and Red Seas, and advanced as far as India. The Phœnicians seem to have been the first who attained any great skill in navigation. They filled the Mediterranean with merchant vessels and planted numerous colonies, the most important of which was Carthage. This city soon excelled

the parent state in maritime adventure. The Greeks early became skilled in navigation, and later the Romans excelled the Carthagenians in naval power.

The art of navigation declined on the Mediterranean with the decline of the Roman empire, but in the meantime the barbarians of the north, the hardy Saxons, Danes and Britons, were attaining great skill as navigators. The first ships were very small. They were usually hauled up on the shore on the approach of winter. Speed was not



FIG. 204.—NORMAN SHIP.

an object. These vessels were called *galleys*. They usually had but one deck, and were propelled mainly by oars, although sails were also used. There were usually two or more banks of oars. It is said one of the Ptolemies built a ship with 40 banks of oars. The Roman turret-galley in the engraving has two banks of oars (*Bireme*). The Romans built their own ships of oak at the bows, and strengthened them with iron or brass for use as “rams.” Vessels thus constructed for “butting” were used in our late war—a revival of a mode of warfare after 2,000



FIG. 205.—ANGLO-SAXON VESSEL.

years of disuse. Fig. 203 shows a Roman *turret* ship, apparently proving that the idea of a gun-turret monitor is not entirely new. The Norsemen built their vessels with very high stems and sterns to resist the waves of their stormy seas.

THE MARINER'S COMPASS AND STEAM.

Before the discovery of the mariner's compass, which was in the early part of the fifteenth century, navigation at any great distance from shore was exceedingly hazardous. The Norsemen, however, before this, had extended their voyages to Iceland, and from thence to Greenland and the coast of Labrador. The discovery of the compass marked a great stride in ocean navigation, and the finding of America by Columbus was one of the first fruits of this knowledge.

The Chinese sailing vessels are called *junks*. They are often of great size, but they are clumsily constructed, and incapable of great speed, although they have proven seaworthy, and capable of making the voyage to America and Europe.

As soon as steam became known as a moving power it was easy to see how it might be ap-

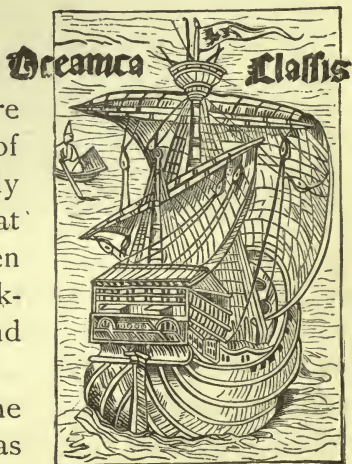


FIG. 206.—SHIP 15TH CENTURY.

plied to navigation, and so, as early as 1543, a Spanish captain, Blasco de Garay, exhibited a steamboat in the harbor of Barcelona, though it does not seem to have been much of a success. Yet it was thirty years after the steam engine had become quite perfect in the hands



FIG. 207.—A CHINESE JUNK.

of James Watt (1777), before a serviceable steamboat was produced. The first attempts at applying the motive power was by means of paddles, used like oars. It was not until the idea of using a wheel with paddles was seized upon by inventors, that steam navigation became a success. Curious it is, that wheel boats were

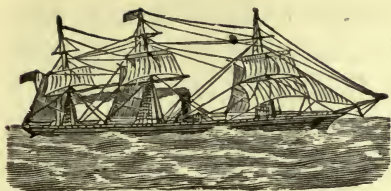


FIG. 208.—MODERN STEAMSHIP.

used long before by the Romans, the wheels being propelled by oxen, horses, or men. The honor of proving the practical utility of the steamboat is due to Robert Fulton, an American inventor. In 1807 he made the first successful voyage. His vessel, the *Clermont*, made the trip from New York to Albany, on the Hudson, a distance of 110 miles, in 24 hours, against wind and current. Five years later Henry Bell made a successful steamboat experiment in Scotland. Steam vessels now attain the speed of 20 miles an hour, and frequently make the passage from New York to England in eight or nine days. A steamship recently made the trip from New York to Queenstown, Ireland, in 6 days, 18 hours, and 37 minutes.

The great difference between the Phœnician, Roman or Saxon galleys and the modern sailing vessel or steamship, strikingly illustrates the vast strides made in the art of navigation. The sailing vessel, in spite of steam, still carries the great bulk of ocean freights. Some of the long ocean voyages occupy several weeks or months. A large ship under full sail is a stately and beautiful object.



FIG. 209.—SAILING VESSEL.

MEANS OF COMMUNICATION.

To-day, if an important event were to take place in London, to-morrow we could read a full account of it in the daily papers. I may write a letter this morning, drop

it in a box, and to-morrow morning read a reply to it written by a friend two hundred miles away. I may even carry on a conversation with a friend fifty or more miles distant, and distinguish the tones of his voice. Our mail systems, telegraphs and telephones, bind the whole civilized world together as one community. It is difficult for us to realize the condition of the ancients, who had none of these rapid means of communication.

The Romans had couriers or runners stationed at intervals along their principal roads for the purpose of conveying messages in time of war, but the posts of ancient times were never used for private correspondence. The first letter postal system was established in Germany, in the early part of the thirteenth century. In England, both public and private letters were in early times carried by messengers, who in the time of Henry III wore a royal livery, and had to provide themselves with horses, but later, in the time of Edward I, regular posts or stations were established, where fresh horses could be hired. From that time to the present, the postal system has steadily and gradually grown.

The earliest form of telegraphing was the use of signals, usually flags and beacon-lights, at sea, and sometimes from elevations on the land. This system of communication by signals is very ancient, and is still in use among sailors. The electric telegraph, one of the greatest inventions of modern times, was first made successful by Samuel F. B. Morse, a native of Massachusetts, in 1844, the first line extending from Washington to Baltimore. The first message was the news of the nomination of James K. Polk for President. Since then some very important improvements have been made, yet none of them were such great strides in progress as the invention of Morse.

In Eastern countries, and especially in Turkey, a spe-

cies of bird known as the carrier-pigeon, has been employed as a messenger. The birds must be brought from the place to which they are to carry the message, and that within a period of not more than two weeks, and when they have young in their nests. The message is written on some light material, and attached securely to the body of the bird. These birds fly at the rate of thirty or more miles per hour, and find their way for long distances with unerring instinct.

AGRICULTURE IN ALL AGES.

The ancient Egyptians were skillful and industrious farmers, yet their tools were of the most simple and rude



FIG. 210.—HOE AND PLOW OF ANCIENT EGYPT.

construction. Their country was overflowed by the Nile annually, which left when the waters subsided a rich deposit of material brought down by that river. Both the Bible and profane history speak of Egypt as the "place to buy corn." Food was produced, not only in such abundance



FIG. 211.—HAND SWIPE OF SHADOOF

as to supply their own dense population, but great quantities of grain were shipped to other countries. The Egyptian plow and hoe are shown in the cut. The plow was made of wood, and consisted of a beam, a share, and two handles. When the water had continued a long time

on the land they dispensed with the use of the plow and simply sowed the seed and drove cattle, pigs, sheep or goats over the field to tread in the grain. On account of the scarcity of rain in Egypt it was frequently necessary to irrigate the land; they used an arrangement for raising



FIG. 212.—WINNOWING GRAIN 4,000 YEARS AGO (EGYPT).

water for that purpose, called a *shadoof*. It is used in Egypt and in Eastern nations to-day for the same purpose. The grain was cut by the sickle or reaping hook. The engraving shows their method of winnowing the chaff from the grain. They were acquainted with the use of manures, and kept the land in good condition by a proper rotation of crops. The Egyptians hatched chickens from eggs by artificial means.

The Greeks and Romans held the farmer in high esteem, and cultivated a great variety of vegetables and fruits, but made no great improvements upon the Egyptians in their methods of agriculture. The Roman plow as shown in the cut, was no improvement upon



FIG. 213.—ROMAN PLOW.

the Egyptian. From the time of the Romans down to the beginning of the eighteenth century no improvement in agriculture seems to have been made, and even to-day in, perhaps, the greater parts of Europe and the East, the ancient methods of plowing, sowing and reaping are still in use. Grain is still cut with the sickle, which differs very little from that used by the Egyptians 4,000 years ago.

FARM MACHINERY.

The first improvement on the sickle was the cradle, or cradle scythe. Its use is almost discarded in our country to-day, but in England it and the sickle are still used by the majority of farmers.

The reaping machine is, however, not a modern invention. Pliny, the Roman naturalist, in the first century of the Christian era, described a reaping machine which he saw in use in ancient Gaul (now France.) It consisted of a cart with projecting teeth which tore off the heads of the grain, and let them fall into a box. The cart was propelled by an ox hitched in shafts in a reverse position, so that he pushed the machine before him. The reaping machine which we see to-day is the result of gradual improvements made since 1851. The earliest method of threshing grain was by beating with a stick. An improvement upon this was driving horses or cattle over it, and still another the threshing sledge, a heavy frame mounted on rollers, and dragged over the grain by oxen. All of these means were used by the Greeks and Romans. The flail, a modification of the simple beating stick, is still used in many parts of the world. The first attempt at a threshing machine was made in 1787 by a Scotchman named Andrew Meikle. No very great improvements have been made on his original machine.

To-day we have machines for almost every species of agricultural work, for preparing the ground and planting, cultivating the crop, gathering the harvest, and separating the grain from the stalk. No machine has, perhaps, had a



FIG. 214.—GRINDING WHEAT IN KABLYA, NORTH AFRICA.

greater effect on general progress than the *cotton gin* invented by Eli Whitney, an American, in 1793. Previous to its invention the process of cleaning the seeds from the cotton was slow and laborious. The American people

have surpassed all others in the production of agricultural machinery, and while they may not be the most economical and scientific in their general methods of farming, by the use of machinery they save time and labor, and in the end produce better results.

From the earliest times grain was ground between two stones, either by causing one to turn on the other, or by rubbing and pounding in a hollow stone with pestle of another stone. The engraving represents a hand mill used to-day in Northern Africa. Until quite recently no change in the manner of grinding has been made, all flouring mills containing the two millstones between which the grain is reduced to a powder, the improvements on the ancient methods consisting in the separation of the bran from the flour and more rapid execution of the work. But of late years grain is being ground between metal rollers, a method which is claimed to be far superior to the old process.

PRINTING.

The art of producing impressions on paper or similar substance from characters raised on a plain surface was known to the Assyrians, and has been practiced by the Chinese for ages. But the printing on paper from movable types as we employ it to-day, is of modern origin. The Chinese are the only people who yet employ the original method of printing by engraving the entire matter of a page on a block of wood from which the impression is to be made. There is a doubt as to whom to give the credit of first employing separate types for each character, but the discovery is generally attributed to Gutenberg, a German, about the year 1438. The first types were of wood, which were soon followed by types cast from metal. Between 1450 and 1455 a Bible was printed by Gutenberg. Copies of this book are exceedingly rare. The first print-

ers attempted to produce books which would closely resemble those written by hand. It was nearly two hundred years after the invention of movable types that mechanical appliances were used to any great extent to facilitate the art of printing. The first printing presses were very imperfect in construction, and difficult to work. Within the present century improvements in the art of printing have followed each other in rapid succession. Now printing presses are in use which throw off as many as 20,000 impressions in an hour, and by taking a stereotype cast which can be done in a few minutes, the type is duplicated and double this number of impressions can be made in an hour. The government printing office at Washington has a press which will turn out 200,000 octavo book pages in an hour. Machines have lately been invented for setting type. Indeed, so rapid are the improvements going on in these lines that one is almost afraid to make any statements for fear of laying himself liable to the charge of being behind the times. I have scarcely space to mention the processes of stereotyping and electrotyping, now so much in use. The former consists in taking a cast or mould of the form or body of type in metal. It was invented by William Ged of Edinburgh, Scotland, in 1725. It has the advantage not only of furnishing a plate from which future impressions may be taken after the type has been distributed, and of duplicating the means of taking impressions quickly, but of saving the wear of printing from the original type. All the large newspapers of the day are printed from stereotype plates. Electrotyping consists in taking a mould of the type in wax, and causing



FIG. 215.—THE INVENTORS OF PRINTING.

a coating of copper to be deposited upon it by means of electricity from a solution of that metal, then melting away the wax, and reinforcing the thin plate of copper by another metal behind it, thus forming a cast with the faces of the letters in copper. From electrotypes plates an immense number of impressions may be made without sensible wear of the letters. This book is printed from electrotypes plates.

The invention of printing from movable types had a wonderful effect on the advancement of mankind, as it brought knowledge in the form of the printed page within the reach of the masses. Before this, books were exceedingly rare and costly, and only the richest men could own a book.

MODERN INVENTIONS AND IMPROVEMENTS.

It would take a large volume to describe all of the inventions and improvements which have contributed toward increasing our comforts and advancing our knowledge within the present century. I should not have space in this work even to enumerate them. I may mention the *sewing-machine*, invented about the year 1841, by Elias Howe, a poor mechanic of Massachusetts. No one can calculate the amount of labor saved by this machine. But if I begin to mention the labor-saving machines which have appeared in the present century, I shall not know where to stop. Not only has there been a great number of original machines produced, but a vast number of improvements on machines and processes which already existed. Improvements are continually being made on all kinds of machinery. Perhaps no one discovery has marked so great a stride in progress within the present century as that of the discovery of the process of vulcanizing India rubber. In 1843, Charles Goodyear, an Amer-

ican, and about the same time in England, Thomas Hancock, found out that if sulphur be heated with India rubber, the latter would be changed to a solid, yet elastic, substance, which could be used for great variety of purposes. It would require several pages to enumerate the purposes for which this hardened rubber has been used. The discoveries and improvements on existing appliances made by Thomas Alva Edison within the last twenty years, would of themselves fill a large volume if they were to be fully described. The telephone, the phonograph, the microphone, the electric light, the numerous and important improvements in telegraphing, are some of the results which have followed more or less directly from his investigations.

PROGRESS IN ART.

From the earliest times man has attempted to beautify his surroundings and gratify an inherent love of the beautiful, by attempts to imitate Nature with the work of his hands. We have seen that even pre-historic man made attempts to adorn his rude weapons with artistic designs and imitations. When we look at the condition of the oldest nation known to history, we are astonished at the early development of art. Indeed, we know the early history of Egypt mainly from the artistic portrayals on its walls, monuments and tombs.

In drawing, the profile view seems to have been the earliest. We may notice this tendency in the uninstructed attempts of children to represent men and animals. Perhaps the idea of drawing a picture originated in the tracing of shadows as they were thrown on a wall or flat surface. Some savages to-day can not understand a picture unless it is drawn in profile. They can not understand the use of lights and shades in representing elevations and depressions in a front view. They think the

shaded parts are simply blackened places. Neither does a savage have an idea of perspective. Nearly all of the Egyptian figures of men and animals are represented in profile, and especially those of the earlier periods of their history.

The Egyptians, although their representations are numerous, attained no great degree of perfection in art. Their pictures have no life, and perspective is usually wanting. Observe the cuts, which are copies of ancient Egyptian drawings in this volume. (See figures 30, 122, 158, 159, 161, 170, and page 231.) This nation made no progress in art, but rather degenerated, as some of their earlier works are much better than their later ones. The reason for this is the fact that their religion strictly forbade any changes in the modes of representing the gods or the human figure. Their art was, therefore, conventional. They had certain rules for drawing an object, and never departed from them. They represented greatness by size alone. When a king or important personage was drawn along with other men, he was always drawn on a larger scale. This was also true of the Assyrians and Chaldeans. (See illustration fig. 224.)

The Egyptians exercised, no doubt, considerable influence on the surrounding nations in the direction of their art, as we always find an inferior people copying and borrowing ideas from their superior neighbors. Some of the characteristic representations of the Egyptians may be seen in the remains of the Assyrians. The earlier Greek art seems to have borrowed much from the Egyptian designs. But imitators often improve upon and finally become superior to the original workman. And so we find it among the Greeks. This people attained an extraordinary degree of eminence in this line. As an evidence of this, see the symmetry and grace in the Greek and Roman

illustrations in this work, especially figs. 70, 79, 80, 103, 104, 118, 120, 152, 178.

I have not the space to enlarge upon the wonderful skill of the Greeks in art. Their sculptors, though they may have been equaled in later times, have never been excelled.

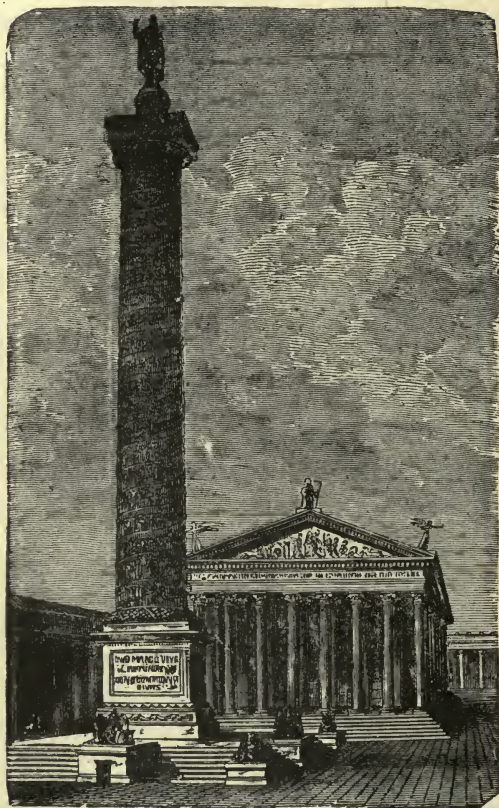


FIG. 216.—COLUMN OF ANTONINUS AND SURROUNDINGS.

With the decline of this nation, art declined, and remained dormant until in the thirteenth, fourteenth and fifteenth centuries it was revived in Italy, and the names of Michael Angelo, Raphael, Leonardi da Vinci, Titian and Correggio, will forever make famous that country and that age.

Modern painters and sculptors have achieved great success, but perhaps have never excelled those of the past.

The spirit of art is, however, to-day more widely diffused, and we see its results in every home and on almost every article of furniture or dress. The beautiful patterns on wall-paper, carpets, calico, etc., and the numerous cheap pictures on cards and advertisements, are but results of a general diffusion of an artistic spirit. Where there

was one artist in the days of Michael Angelo, to-day there are a thousand.

Many of the artistic representations of the ancients were known as bas-reliefs, that is, the objects were represented as carved on a plain surface, but standing out, or projecting nearly half their thickness. These bas-reliefs are especially numerous in Assyrian and Persian



FIG. 217.—ORGAN 14TH CENTURY.

ruins, and are a great source of history, as not only objects, but actions, are represented. Bas-reliefs are shown on the column and building in the engraving figure 216. On the columns of Trajan and Antoninus, still standing at Rome, hundreds of historical scenes, with arms, soldiers, engines of war, dwellings, etc., are minutely and faithfully depicted. The sculpturing advances in regular spirals around the shaft, which is over one hundred feet high.

Music, as a fine art, may be said to be entirely modern. Judging by the comparatively rude instruments of the an-

cients, they were not able to represent properly intricate compositions. In fig. 77 a Greek may be seen with a double pipe. The Egyptians had a number of instruments, among them the *double pipe*, as seen in fig. 122. It is only within the last two centuries that the manufacture of better musical instruments and



FIG. 218.—SHEKEL OF BAR COCHAT (JEWISH).

the works of the great composers, especially the German, have elevated music to its present lofty station.

There is probably no nation so low in the scale of civilization as to be incapable of enjoying music. The music of savage or semi-civilized nations is very rude. The Chinese have drums, fiddles (with a single string sometimes) and various asthmatic instruments. They will play for hours at a time. Their music is more amusing than æsthetic. The Turcomans have two species of flute, or pipe on which says O'Donovan, a recent writer, they will blow until utterly exhausted, and begin again at the earliest possible moment. The wild shrill melody has scarcely any

resemblance to a tune.



FIG. 219.—SHILLING OF CROMWELL.

In the matter of engraving on metals and gems, and in stamping metals and coins, a high degree of perfection was attained at a very ancient

date. In fact, it is doubtful whether modern workmen can excel the ancient. The beauty of ancient work may be seen by examining the exquisite gold vases of

Egypt, on page 431, and the Roman solid silver vases, on page 440.

In coins there is probably improvement. The *shekel* of Bar Cochat is not bad. The coin of Caligula (page 280), though nearly cotemporary, is better in execution. The shilling of Cromwell, 1,500 years later, does not seem much of an improvement.

Specimen coins of all ages are easily obtainable, as coins are safely preserved in the earth when other articles would perish. The Chinese have coins with holes punched in

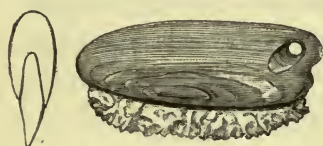


FIG. 220.—STONE SAW.

the center. These are then placed upon strings, and called *cash*. Within the past century coins have been made with two deep grooves crossing at right-angles so the piece could be broken into *quarters* for change. The American Indians did not coin money, but used instead strings of shells and beads called *wampum*. Many ancient coins were made of bronze.

In the matter of *tools* there is such a bewildering variety that it would be useless to attempt any description of them, or even to name them all. Suffice it to say that the most *common* tools came into use at a very remote



FIG. 221.—EGYPTIAN SAW.

antiquity. Fig. 220 shows a curious little saw, of the *stone age*, and the manner of setting it into the handle. Fig. 221 is an Egyptian saw of four thousand years ago. The latter people must have possessed very superior tools, for thousands of hieroglyphics were engraved *clearly* and

beautifully on flinty granite. It is the opinion of experts that this work could not have been done so well at the present time in such vast quantity

The making of books in great numbers and handsomely illustrated, is a modern invention. The ancient book consisted of a long roll. The columns of reading ran *at right angles* to its length. There was a roller at either end, so that the reader could roll up the book as he unrolled in reading. Hence the word volume, from *volvere*, to roll. A wooden case was made to hold the book. Memoranda were kept on wax tablets, on which letters were made with an iron instrument, called a style (Lat. *stylus*). The letters were smoothed out when no longer needed. (See illustration accompanying, also fig. 137.)

Very large libraries, however, existed in ancient times. Among the most celebrated were the library at Alexandria, Egypt, which was said to contain 700,000 volumes. It is supposed to have

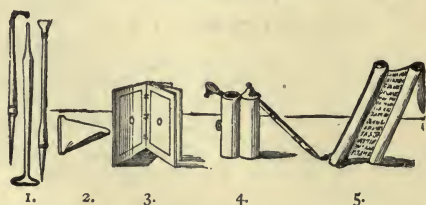


FIG. 222.

1, STYLES. 2, ERASER. 3, TABLETS. 4, CASE FOR VOLUME. 5, A VOLUME.

been burned by the Saracens in the seventh century A. D. The royal library of Assyria which existed over 3,500 years ago, was a marvel for its time. The books were made on clay tablets in the cuneiform writing, a specimen of which is shown on page 168.

PROGRESS IN POLITICAL, RELIGIOUS, AND SOCIAL IDEAS.

There is also great advance in the ideas of mankind concerning the rights of the common people. Formerly it was held that the masses were created expressly to minister to the wants and caprices of their rulers. Such ideas unfortunately prevail to a great extent in Europe and

Asia to-day. But in the United States every man can truly say his welfare is in his own keeping. Formerly the vanquished had no rights except what the victors chose to grant. When the Normans invaded England, under William the Conqueror, they treated the Saxons much as they would wild animals. In order that the Normans might have hunting grounds, the "New Forest" was established by driving the inhabitants out of a territory thirty miles in extent.

It is only necessary to call attention to the fact that as man progresses in knowledge, and as education is diffused, among the masses of people, the political and reli-



FIG. 223.—EGYPTIAN PRISONERS.

gious notions of the world will tend to assume a higher grade. Wrong political and religious views are but the results of ignorance of the nature of man, and the wants of society. The persecutions which have characterized most religious sects in the past, were but the results of an ignorance of human nature, and all the wars which have convulsed nations since the days of Adam have been the results of an ignorance of the true relations of man to man in society. There is one broad platform on which all may stand and be at peace with each other, and that is the platform of universally diffused correct knowledge of man's nature, and his relations to his fellow-man.

That there has been progress in this direction, no one

will deny. Wars are not projected on such slight pretenses as in former times, and oppression of man by his fellow-man is not so prevalent as of old, and religious persecution is almost a thing of the past.

The most ancient nations had many cruel and revolting customs. The Egyptians punished some of the

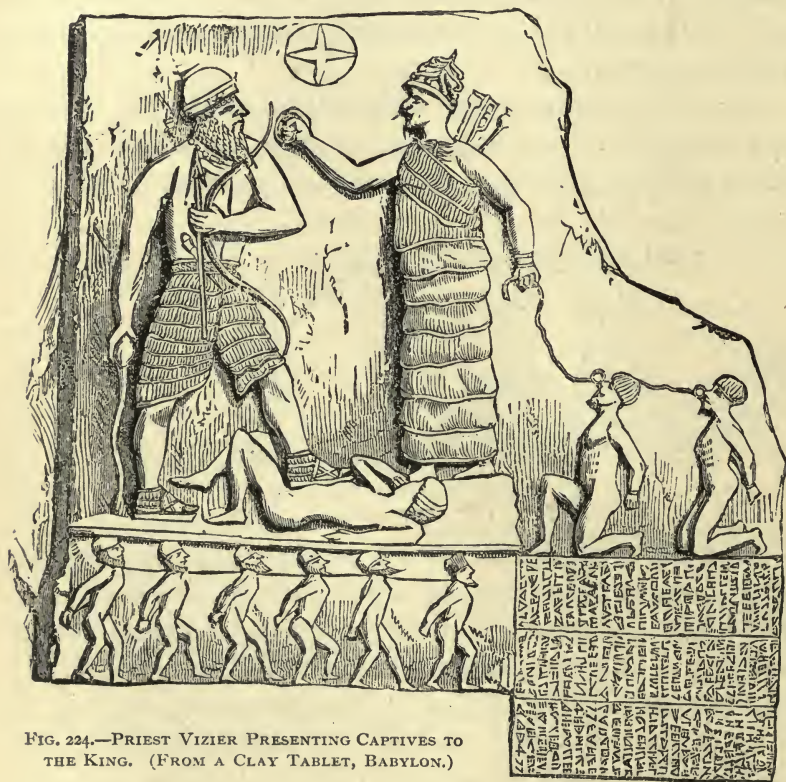


FIG. 224.—PRIEST VIZIER PRESENTING CAPTIVES TO THE KING. (FROM A CLAY TABLET, BABYLON.)

most trivial crimes with the severest punishments. Slavery was common, and slaves were very cruelly used. When prisoners were taken in war, they tied their arms behind their backs or over their heads in a constrained position, and fastened a number together with ropes passed around their necks. The cuts representing the

treatment of prisoners among the Assyrians and Babylonians explain themselves. Torturing prisoners accused of crime to make them confess, was common among the Romans and other ancient nations, and was continued even in England to some extent, down to the close of the eighteenth century. Even witnesses not accused of crime, were tortured to extract the truth from them. This custom is unknown to-day in civilized countries, though continued in China.

In ancient times insane persons were punished, or cast out from society. Insane asylums are modern institutions. Great improvements have been made in the treatment of the insane within the last fifty years. It was the custom, even in asylums, to beat the inmates, and cruelly use them in many ways, under a wrong idea of the nature of their disease. Asylums for the blind, for the deaf and dumb, and for orphans, infirmaries, reform schools, industrial schools, and aid societies of various kinds are all of comparatively modern invention, and increase in numbers and efficient management as the years go by. When the city of Chicago was burned, and thousands were made destitute, with what lavish hands was aid presented in the form of donations coming from all parts of our land, and from across the sea. The sufferers from the Ohio River floods are, while I am writing these lines, being provided with food and shelter by donations coming from generous hands all over this country. Could this have been possible two hundred years ago?

Temperance reform is also a feature of modern civilization. In fact, there is scarcely an evil existing in civilized countries against which there has not been an organized effort made, and with a considerable degree of success.

The position of woman in the social scale has gradu-

ally advanced, and while it may be a step in the wrong direction, it is an indication at least of the great desire for progress, that she is asking to be placed upon an equal footing politically with man.

While the world is still full of suffering and wrongdoing and ignorance, who will not say, when comparing the past with the present, that the human family is progressing in civilization?

Progress, though seemingly slow, is in a geometrical ratio. One cause of progress works with others to produce results, which again are causes working for the production of higher results. In the language of Charles Loring Brace, "As man develops and society advances, the races in which there is the highest development of sympathy, of benevolence, of sexual purity, of truth and justice, will tend to be the strongest in body, the most closely united, the most prosperous, the most free, the most influential on inferior races, and the most powerful, as attracting other members to themselves. All the destructive influences of the world will be less operative on them. The death-rate of such a race will tend to be the lowest possible; the physical vigor the highest; the inequalities of fortune will be the most compensated for; the trade and intercourse with all other nations the freest; the laws and social customs will the most approach perfect justice and humanity; all the resources and abilities of the most favored members will be habitually used for the most unfortunate, but only so far as to strengthen them. The power of such a race will far transcend anything hitherto known, for each member is permitted the utmost possible development of all his faculties, and vigor of intellect is almost sure to accompany great moral advance."

BOOK III.

NATURE AND CONSTITUTION OF MAN.

PART I.—THE WONDERS OF THE HUMAN BODY.

INTRODUCTION.

The ancients knew very little of the structure of the human body. While other sciences, as astronomy and geometry, had made considerable advancement, the science of anatomy was yet a mass of conjecture with scarcely any accurate knowledge of the internal parts of the body. Hippocrates, a Greek philosopher (460 to 377 B. C.), who was called the "Father of Medicine," had some general knowledge of the human body, especially in regard to the bones, but on the whole, his knowledge was extremely superficial and inaccurate. He taught that the brain secreted the mucus that came from the nostrils, and that the heart contained air as well as blood. He had no knowledge of the nerves, and applied this term to the sinews or tendons. Aristotle, another Greek philosopher of great note (b. 384 B. C.), made considerable advancement in the study of the subject, but all of his knowledge was derived from observations on the lower animals. Erasistratus was the first to dissect a human body about 300 B. C. In the first century of the Christian era, it was for-

bidden under heavy penalties to dissect human bodies. Galen, one of the greatest physicians of his time, dissected monkeys, and occasionally a human body in secret.

No great progress was made until the seventeenth century. William Harvey discovered the circulation of the blood in 1619.

The term *Anatomy* (from two Greek words, and meaning to "cut apart") is a description of the structure or make up of the body. *Physiology* means literally a "Discourse on Nature." It is the science which treats of the functions, or uses of the various parts of the body. The two sciences, as will be seen, should be studied together.

In the following pages I shall endeavor to avoid the use of technical terms as much as possible. It will be necessary, however, to use a few words which will be new to those who have not studied the subject. Many of them will be explained in the connection in which used. The reader must bear in mind, that in order to describe the parts of any structure, or machine, it is necessary to give them names. The names of the various parts of the human body are mostly from the Latin and Greek, and were given many years ago, when those languages were the common languages of the learned, and while they have a strange sound to us, they were not strange when first given. We could not well change them now for two reasons; first, it is difficult when a name becomes fixed to accustom ourselves to a new one, and second, the new names, while they might be shorter, would be just as strange, and hard to learn. It must be remembered that all trades and professions, and even games have their *technical* terms, or words which are peculiar to them alone, and that the sciences of anatomy and physiology are no exceptions. To a person who has never

played base ball, an accurate description of a game would be unintelligible, because of the necessary use of many words which have a meaning as applied to this game, and are used for no other purpose. So it is with any science; the student must expect to encounter many new words which he must learn the use of as he goes along. Many of the terms were given because of some fancied resemblance to other objects. Some are the Latinized names of great anatomists, or physiologists, others indicate the use of the part, others again are simply the old Latin, Greek, or Anglo Saxon common names of the parts, as the brain, the heart, liver, etc., which were familiar objects of conversation, and of course had names from early times.

I have in the following pages given a general description of the parts, or organs of the body, with some account of their respective uses, and occasional hints as to their preservation in a state of health.

The latter subject is usually denominated *Hygiene*, and will be more fully discussed in a general way in another part of the work. I have not attempted to write a work on Anatomy and Physiology, but simply to carry out the title "Wonders of the Human Body," by giving some of the important and interesting points in connection with its structure and preservation.

It is believed, however, that with the aid of the excellent illustrations the ordinary student may obtain a sufficient and accurate knowledge of Anatomy. There is a woful lack of such knowledge in most homes, and this is specially a book for home study. If I succeed in arousing an interest among the children upon this subject, a great work is accomplished.

CHAPTER I.

THE BONY FRAME—WORK.

A human skeleton is commonly looked upon as a grim and ghastly object, and we involuntarily associate with it the thought of death and its horrors. Yet it is very easy for a thinking mind to divest itself of such thoughts, and to look upon it as a wonderful contrivance, a beautiful adaptation of means to an end.

We notice first that it is a frame-work of strong and solid material held together by ligaments, or united by seams, clothed with flesh, and that it supports and protects more delicate organs. This frame-work is made up of 200 distinct pieces, or bones, fitted together in a variety of ways, combining strength and protection with lightness and freedom of motion.

BONES OF THE HEAD.

The bones of the body are for description conveniently divided into those of the *head*, *trunk*, and *extremities*. The bones of the head consist of those of the cranium and face, both together commonly called the skull. The *cranium* is that part which incloses the brain, and is made up of eight bones firmly joined together by their edges. In some places they are joined by slightly roughened surfaces, locking together, in other places by a series of projections, not unlike the teeth of a saw, or like the “dove-tailing” of cabinet work.

The outside of the cranium is smooth, and rounded so that when any object strikes it from any direction, the mis-

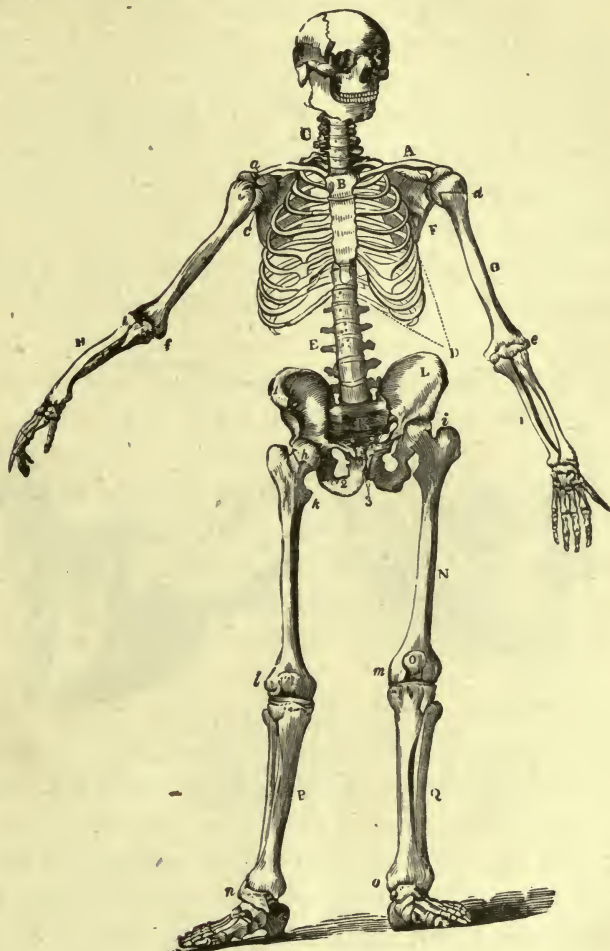


FIG. 225.—The Human Skeleton.

- | | |
|--------------------------------|------------------------------------|
| C. Cervical Vertebrae. | N. Femur, or Thigh Bone. |
| D. Dorsal " " | O. Patella, or Knee Cap. |
| E. Lumbar " " | P. Tibia, or Shin Bone. |
| L. Os Innominata, or Hip Bone. | Q. Tibula. |
| A. Clavicle, or Collar Bone. | G. Humerus, or Arm Bone. |
| F. Scapula, or Shoulder Blade. | H. Radius } Bones of the Fore Arm. |
| B. Sternum, or Breast Bone. | I. Ulna } |
| K. Sacrum. | n. Tarsus. |

sile has a tendency to glance off without serious injury to the head. The bones of the top and sides of the cranium

have a somewhat uniform thickness, the thinnest place being usually in the region of the temples. The average thickness of the skull is one-fifth of an inch. The thickness near the temples is usually not much over one-eighth of an inch. There are, however, some remarkable variations from these figures. Skulls have been examined which were hardly an eighth of an inch in thickness in any part, and others which were in every part over an inch thick.

The flat bones of the head consist of two plates of hard material, an outer and an inner, called tables. Be-



Fig. 226 — Skull, Front and Side View.

- | | |
|------------------|-------------------------------------|
| A, Frontal Bone. | E, Malar, or Cheek Bone. |
| B, Parietal " | F, Superior Maxillary or Upper Jaw. |
| C, Temporal " | G, Inferior Maxillary or Lower Jaw. |
| D, Sphenoid " | H, Occipital Bone. |

tween them is a variable quantity of spongy, or less compact, bony material. This arrangement is better adapted to protect the brain from concussion, than if all were in one solid plate. Blows, however, sometimes break the inner table of the skull, leaving the outer unharmed. In this case, as well as when the outer table is also broken, there is often pressure upon the brain, causing unconsciousness, and it is frequently necessary for the surgeon in such cases to perform the operation of trepanning,

which consists in boring with a proper tool, a little hole in the skull for the purpose of introducing a hook or lever to elevate the bones and relieve the pressure.

Just over the eyes the two tables of the skull do not come together, but a cavity of variable size exists. This cavity communicates with the nose, and is lined with a membrane, similar to the mucous lining of the nose and air passages. These cavities are called *frontal sinuses*.

At birth the bones of the skull are separated from each other by intervals which are filled with a soft membrane. In certain places, these intervals are of considerable size. One just above the forehead at the junction of three bones, is diamond shaped, and sometimes an inch in diameter. This usually remains open until the second year, and rarely through life. The others are smaller, and situated in the back and sides of the head, and usually close up shortly after birth. They are called fontanelles (little fountains), because, when the hand is placed on the head, the arteries may be felt pulsating at these places, and the feeling was likened to the water rising in a fountain.

Bones at an early stage in the embryo are soft or cartilaginous, and develop gradually into true bone. This development begins in one or more main centers in each bone, and proceeds outward. These fontanelles are the

It may be said appropriately here (as space will not allow a separate chapter on the subject) that the growth of *all* life, animal and vegetable, is by *cells*. An entire volume could be written on this subject alone. Suffice it to say that these cells take many forms, from the simple *sphere* or *scale* to the complex nerve cell with several appendages. The accompanying figure shows the form of *cartilaginous* cells; in fig. 247 is shown the form of epithelial cells of the intestines; in fig. 260 the form of nerve cells; in fig. 254 the *plates* of a hair.

parts most distant from the centers of development, and consequently the last to be filled up with true bone. Sometimes a new center of development starts in the midst of a fontanelle, and then an extra bone of small size is formed. These supernumerary bones are called Wormian bones, from Wormius, who first pointed them out.

It may be asked why would it not be as well if the cranium was all in one piece, since the parts are joined

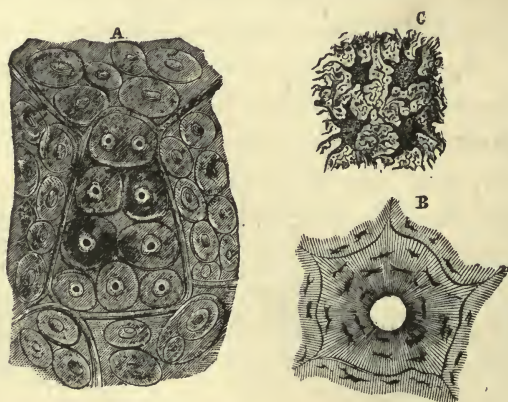


FIG. 227—Osseous and cartilaginous tissues as seen through the microscope.

A, Cells of cartilaginous tissue.

B, Section of a canal of Havers, showing the disposition of the starry cells in the substance of a bone.

C, Starry cells magnified.

together so solidly. The answer is, that the liability to extensive fracture is not so great when there are a number of bones. The head in this respect may be compared to a window with many panes of glass. The bones at the base of the skull are very rough and uneven to afford surface for the attachment of muscles. On the top and sides of the head, where no muscles are attached, they are very even and smooth.

There are fourteen bones in the face, twelve in pairs, and two single bones. The lower jaw is the only movable

bone of the face. This bone varies considerably with age. In childhood, before the appearance of the teeth, it has less of an angle than in the adult, because the teeth do not keep the jaws apart. In old age when the teeth are lost, the angle becomes again less, and the bone becomes more slender. This accounts in part at least, for the peculiar tone of an old person's voice. The tone of old age may be imitated by forcibly projecting the lower jaw in speaking. The lower jaw is sometimes dislocated by the simple act of yawning.

The upper jaw consists of two bones firmly united. A large cavity exists in each bone, communicating with the nasal passages by a small aperture. This cavity is lined with a mucous membrane, and is sometimes the seat of inflammation and abscess, and it becomes necessary to tap it to let out the accumulated pus. This may be done through the socket of the eye-tooth, or in that neighborhood. The cheek-bones are just below the eyes, and with the frontal bone of the cranium, form the main part of the orbit, or the bony socket for the eyes. The bones of the nose are two in number, small, and set together like the two sides of the roof of a house, and form the "bridge of the nose." The upper jaw-bones, together with two irregular small bones, form the roof of the mouth, and the floor of the nasal cavity. The upper and lower jaws are furnished with deep sockets, which hold the teeth very firmly. The *teeth* are not true bone, and will be described in another place.

THE BONES OF THE TRUNK.

Before speaking of the bones of the trunk we must mention a peculiar bone which cannot be classed with either the bones of the head, trunk, or extremities, as it has no attachment to any other bones, and is located in a

position between the head and trunk. We refer to the *hyoid* bone. It is named from its shape, which resembles that of the Greek letter U (upsilon). It may be felt just above the larynx, or "Adam's apple." Though small and of delicate structure, it has considerable range of motion, and gives attachment to eleven pairs of muscles. It is sometimes broken, when one person attempts to choke another by seizing him violently by the throat. This bone is largely developed in the howling monkeys, and forms in them a kind of drum which, in connection with the windpipe, increases the sound of the voice.

The bones of the trunk consist of the sternum, or breast bone, the ribs and the spinal column, or back bone.

The *breast bone* is lighter than most of the bones, containing, as it does, more spongy matter, although the thin outer layer is of very dense structure. It consists in the child, of six portions closely united, and in adult life of three portions, the second, third, fourth and fifth portions uniting at various periods of life, while rarely the first and second portions unite in old age.

There are twelve pairs of *ribs*. Very rarely this number varies to eleven or thirteen. The seven upper ones are called *true* ribs, and are attached to the sternum, directly by separate pieces of cartilage. The remaining five are called *false* ribs, three of them being united by means of one cartilage to the sternum, the other two being free. These latter are sometimes called floating ribs. The ribs are all attached to the spinal column, and movable upon it, inclining downward, so that when raised in breathing, the cavity of the chest is enlarged.

The *spinal column* is made up of twenty-four pieces called *vertebræ* (singular, *vertebra*), and two other bones which seem to be made up of *vertebræ*, firmly locked together. The first or uppermost is called the atlas, from

the fabled story that a giant of this name held the earth on his shoulders. Upon this bone the head moves backward and forward. The second vertebra is called the axis, and it is upon this that the atlas, carrying the head with it, moves from side to side. This bone has a projection which passes through the atlas like a pivot. When criminals are hung, and the neck dislocated, this pivot presses upon the spinal cord, and produces death. The vertebræ in general are characterized by a main portion called the body, processes, or spines, and a ring-like opening in each, which, when all together, forms the spinal canal, containing the spinal cord.

The vertebræ are connected by a spongy elastic substance, which yields to pressure, and aids in breaking the force of jars and shocks. A person on his feet, or in an upright position during the day, will be shorter at night than in the morning, because the weight of the body compresses these elastic cushions slightly. They again resume a relaxed condition when the body is reclining and at rest. These parts being each slightly movable on the other, give sufficient flexibility, and being arranged so that the spinal column as a whole presents a double curve, the liability to produce a shock to the brain in running, leaping, etc., is very much diminished. A fracture of the spinal column is rarely, if ever, fully repaired. Usually in such cases the spinal cord is seriously injured.

The two other bones of the spinal column referred to, are the *sacrum* and *coccyx*. The former consists usually of five pieces firmly joined. It takes its name from the fact that this portion of an animal was used in sacrifices. The latter is composed usually of four pieces firmly joined. It forms the lower extremity of the spinal column, and an extension of it, in monkeys, forms the tail. It is so named from its resemblance to the beak of a cuckoo.

BONES OF THE EXTREMITIES.

The *hip bones*, which are classed with the lower extremities, are broad and irregular, and each consists, in the child of three pieces, which in adult life unite and form one bone. They receive the long bones of the thigh, forming what is called a ball-and-socket joint, and are firmly united to the sacrum.

The bones of the extremities, of course, are in pairs. The *thigh bone*, or femur, is the longest bone of the body. From the knee to the ankle there are two bones, a larger one and a smaller, which acts as a brace. Immediately over the knee joint is the knee-pan or knee cap, a small rounded bone which acts somewhat as a pulley to change the direction of the force of the muscles which move the leg. There are seven small irregular bones in the ankle, and nineteen in the foot, bound together by ligaments, so that great elasticity and variety of motion is secured.

The *collar bone* is one of the bones of the upper extremity. It is less curved and more slender in woman than in man. This will perhaps account for the fact that woman is not so dexterous in wielding an ax or throwing a stone as man. It acts as a brace to the shoulders and is one of the bones most liable to be broken. The shoulder blade is somewhat in the shape of a mason's trowel. It receives the long bone of the arm and corresponds, or is analagous to, the hip bone of the lower extremity.

The *upper arm* has but one bone, the *fore arm* two bones. The one on the side next the thumb rotates on the other, thus giving a varied motion to the hand. The wrist has eight small, irregular bones, and the hand nineteen bones.

The human *hand* is indeed a wonderful contrivance, being capable of an almost infinite variety of motions, due

to the number and form of the bones and the peculiar manner in which they are joined together by ligaments, and the manner of attachment of muscles.

It may be asked why the curious *crooked forms* of bones. It may be said in answer, that each bone is peculiarly adapted for its special purpose. The elevations and depressions are to afford surface for the attachment of the proper muscles and ligaments. The particular shapes are adapted to the end designed, whether that be for protection of delicate parts, as the bones of the head and the ribs, or for use as levers, as in the long bones of the limbs, or to give slight varied motion, as in the hand, foot, and spinal column.

The *long bones* are tubes filled with marrow. The advantage of this arrangement over a shaft of solid bone substance is obvious. It gives strength with lightness. It may be observed also, that the long bones have large heads or extremities, and that these extremities are composed of a thin layer of compact substance inclosing a mass of spongy material. This gives more surface for the attachment of muscles, and for the formation of joints and at the same time secures lightness, the shafts being composed of solid material to give strength where it is most needed.

The bones which are *movable* on each other are strapped together by tough elastic bands, called ligaments. These give strength to the joints, and at the same time allow great freedom of motion. Some of the joints are like hinges of a door, capable of movement in two directions only; such are the knee, ankle and elbow. Others, as the shoulder and hip, are capable of a rotary motion as well, in fact, motion in all directions like the universal joint in machinery. The ends of the bones in the joints which are capable of much motion are very smooth, being cov-

ered by a somewhat dense and elastic substance called *cartilage*. All such joints have an arrangement by which they are self-oiling. A ligament in the form of a short, wide tube incloses these joints and contains an oily or mucilaginous fluid which lubricates them. This fluid is called *synovia* from its resemblance to the white of an egg, also called "joint water."

Bones are frequently dislocated, or thrown out of place. When there is a *dislocation* of a joint we always speak of the bone furthest from the body as being dislocated from the other. The shoulder joint is most liable to dislocation. Bones should be reduced, or set, as soon as possible after dislocation. If allowed to remain in that condition they may adapt themselves to the new position, and a kind of false joint be formed, but it is at the ex-

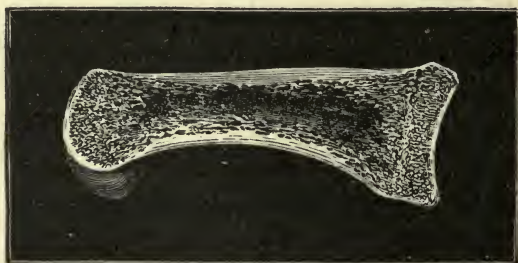


FIG. 228.—Bony tissue as seen with the naked eye.

pense of deformity and lameness. Serious consequences often result from want of, or improper adjustment of, a dislocation. There are occasionally persons who have the power of dislocating and reducing the principal joints at will. This is due to the fact of their having unusually long ligaments, and aided perhaps by practice.

MICROSCOPIC STRUCTURE OF BONES.

A thin section of bone under the microscope is a beautiful object. It is seen to consist of a number of minute

channels, and around these is the bone substance which seems to be arranged in circular layers in which are seen circles of dark spots with fine dark lines radiating from them. These dark spots and lines are minute cavities

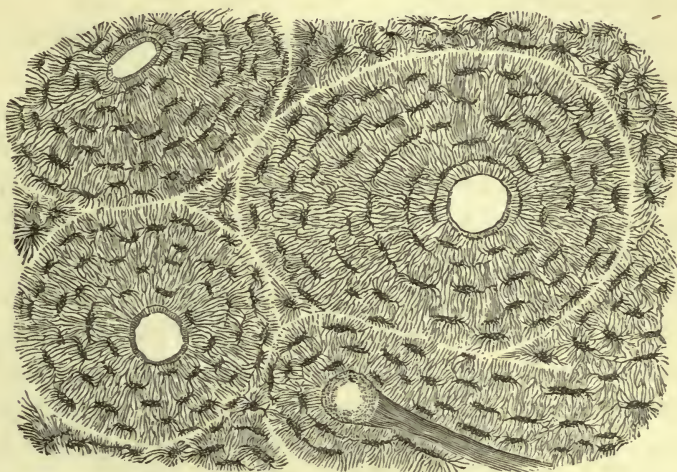


FIG. 229.—Cross Section of Bone Under the Microscope.

which communicate with the channels. The nourishing part of the blood circulates through these channels and cavities, and builds up and keeps the bone in repair.

CONSTITUENTS OF BONES.

Bones are composed of about two-thirds earthy, or solid matter, and the remainder of a soft animal matter called gelatine. These materials may be separated by immersing the bone for a few days in a weak solution of sulphuric or hydrochloric acid. This dissolves out the earthy matter, leaving the animal matter, which still retains the form of the bone, but it is so soft and flexible that it may easily be tied in a knot. If a bone be placed in the fire the animal matter is burned out, leaving the earthy matter, which retains the form of the bone, but is very

fragile. A proper proportion of these materials is necessary to give the greatest strength. If the earthy matter be deficient, the bones will bend by the mere weight of the body ; if the animal matter be deficient, the bones are liable to be easily broken.

In childhood the bones contain a greater proportion of animal matter, and are soft and easily bent. Children often get bow-legged by being encouraged to walk before their bones are sufficiently solid to bear the weight of the body, and young persons are often deformed by long-continued, constrained and unnatural positions resulting from their employment, or inflicted as a punishment. On the other hand the bones of old persons are more brittle because of an excess of earthy matter. This explains why children, though they get many falls seldom break bones, while old persons often receive fractures from slight causes. Human bones of a healthy adult when used as levers, are said to be three and a half times as strong as lead, more than twice as strong as elm, oak and ash wood, and twenty-two times as strong as sandstone.

DISEASES OF THE BONES.

Bones are liable to diseases similar to other tissues of the body. They inflame with difficulty, but when inflammation does take place it is much more serious in its results. Tumors of various kinds often occur in bones, and peculiar morbid or unnatural growths sometimes take place, forming large knots or elevations. The rickets is a disease of bone peculiar to very young children, though it may occur as late as the twelfth year. The earthy matter is either absorbed or never produced, and the bones become very soft and flexible. Great deformities are consequently the result. A similar softening of the bones occurs sometimes in adults, but it is distinguished from

rickets by being attended with pain. The opposite condition, or a deficiency of the animal matter, making the bones extremely fragile, not unfrequently occurs as the result of disease. It is more common in old age, but

may occur at any period of life. It is sometimes confined to a few bones only. Cases are on record where bones under such conditions were broken by mere muscular contraction, the effort of throwing a chip, catching the toe in the carpet, even by turning over in bed. Gross tells of a woman who fell from a third story window and received eighty fractures.

The bones are covered with a thin membrane, adhering tightly and containing the vessels which afford nourishment to the bone substance. So long as this covering is not destroyed, the bone may grow again if removed by decay or an operation. A felon, or whitlow, is an abscess under this covering, the best remedy for which is a full and free incision through to the bone to let out the pus.

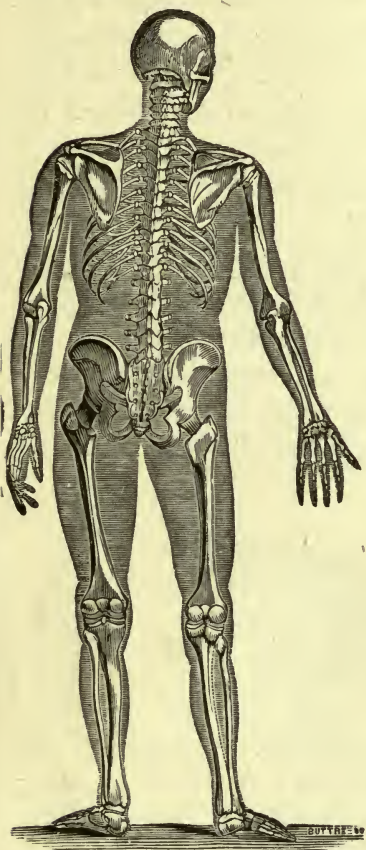


FIG. 230.—Proportion of Bone to Bulk of Body.

Some wonderful operations are performed on bones by surgeons. The main part of a bone has been taken out, leaving the periosteum, or covering, and the operation followed by growth of new bone. In the case of a

stiff knee joint where the leg is permanently bent on the thigh, the leg has been straightened by the surgeon sawing out a wedge-shaped piece of bone above the knee and bringing the limb to a straight position, so that the cut surfaces would come evenly together and unite by the two ends growing together. This, of course, shortens the limb, and it still remains stiff, but it is much more serviceable than a crooked limb. The ends of the bones are often sawn off in the knee joint for the cure of disease of this part, and recovery takes place with only a slightly shortened and stiffened limb.

Where bones are broken Nature sets about to repair the injury by throwing out a jelly-like material, not only between the broken ends, but along the sides of the fracture. This substance soon hardens into true bone and the two pieces are, as it were, welded together. The superfluous welding material is afterward wholly or partly removed by absorption.



CHAPTER II.

THE MOVING POWERS OF THE BODY.

All the various motions of the body are caused by the contraction of bundles of fibers called *muscles*. They are known as the flesh or lean meat. There are about five hundred of them and they give roundness to the limbs and trunk, and form the principal part of the bulk of the body. They are connected at their ends with the bones, cartilages, ligaments, or skin, either directly or by means of fibrous cords called *tendons* (sinews), and covered with thin

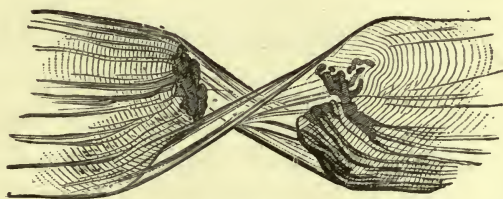


FIG. 232.—Muscle fiber torn across, the sarcolemma, or covering, still connecting the two parts of the fiber.

membranes. The majority of muscles are seen by the naked eye to consist of fine fibers or threads, and with the aid of the microscope they are found to be arranged in bundles covered with thin membrane, and these bundles to be arranged again into still larger bundles. The little fibers, when placed under a high magnifying power, are seen to be made up of still smaller fibers and each of these to consist of a row of minute particles, which by shorten-

ing and lengthening, produce contraction and relaxation. Muscles with the structure here described are generally *voluntary* muscles, that is, they are under control of the will. Some muscles, however, are *involuntary*, acting independent of the will; such are the muscles of the walls of the stomach, the heart, etc. Many of these involuntary

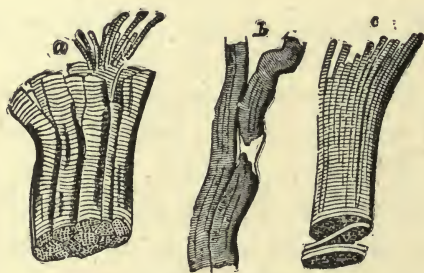


FIG. 233.—Sections of Muscles.
(a) and (b). Bundles of Fibers Magnified. (c). The same showing Layers.

muscles have not this structure, but consist of flattened bands interlacing in various directions.

FORM AND ARRANGEMENT OF MUSCLES.

Muscles vary greatly, both in *form* and *size*. Some have the fibers running like the ribs of a fan, others like the vein of a feather, others cylindrical but thicker in the middle than at the ends. Some are circular and act like a draw string in a purse. Such is the muscle around the mouth. They vary in size from that of a tenth of an inch to two and a half feet or more in length. The muscles of the ear, which are so active in the lower animals, are very small and inactive in man, and are said to be rudimentary. Occasionally, however, a person is seen who can move his ears to some extent.

The muscles, like the bones, are nearly all arranged in pairs, both sides of the body having similar muscles. There are thirteen not thus mated. Nearly every muscle

has one or more antagonists, or those which produce motion in opposite directions. Every muscle in the body has a name from the Greek or Latin, and derived from the points of attachment, the resemblance in shape to other objects, or from their use.

THE TENDONS.

The tendons are very strong fibrous cords or bands of a silvery whiteness. In structure they resemble the ligaments. In many places they may be felt as rounded cords beneath the skin. They are commonly known as "leaders." What are called the hamstrings in animals are tendons of the large muscles of the hinder limbs. The largest tendon of the body is the one inserted into the heel bone, and is a continuation of the large muscles composing the "calf" of the leg. It is called the tendon of Achilles. It is so named from the Grecian warrior, the hero of Homer's great poem. The story goes, that when a child his mother plunged him in the river Styx, and he became in every part invulnerable except the heel by which she held him. He was finally killed by a wound in this part. In one form of the deformity known as "club-foot," this tendon seems to be too short, and the heel is drawn up, the patient being compelled to walk on the toes. This may be in many cases remedied by cutting the tendon beneath the skin by a very narrow-bladed knife; the operation being followed by contraction of the severed ends, leaving quite a space between them, this space subsequently filling up by the growth of new matter, thus lengthening the tendon.

CONTRACTILITY OF MUSCLES.

The peculiarity of muscular fiber is its power of contraction. When a muscle contracts it grows shorter and

thicker, and the parts to which it is attached are consequently drawn nearer to each other. There is always one point of attachment which is relatively fixed, called the *origin*, the other part is movable, and called the *insertion*.



FIG. 234.—Front View of the Muscular System.

These points in some muscles are interchangeable, according to the nature of the action.

Muscles contract only when acted upon by an appropriate stimulus. We will to move a limb, and the muscles

contract, and it moves. This stimulus of the will is conveyed from the brain through the nerves, for if certain nerves are severed we have no power to move that part. But the will is not the only cause of muscular contraction. The involuntary muscles act from the stimulus of vital force. A sharp blow upon a muscle will cause contraction, also currents of electricity or any mechanical irritation of the nerves. This power of contraction does not always cease with life. After death from certain diseases muscular movements may be observed. The twitching of the muscles in a beef after the skin is taken off may be observed by any one. Electricity will cause powerful contractions in a muscle long after death. The application of a battery to the dead bodies of criminals has been tried with the effect of producing frightful grimaces and powerful contortions of various parts of the body. The muscles of some cold-blooded animals, as the turtle, have been observed to contract for a couple of days after the head has been severed from the body. When a limb is amputated from the human body the muscles may be seen to contract, but for a very short time only.

A muscle cannot remain long in a contracted state. It seems to become weary and must relax, but is capable of again contracting after a brief rest. The heart is a hollow muscle, which alternately contracts and relaxes all through life. It gets rest between the intervals of contraction. It is more tiresome standing than walking for the same length of time. The muscles of the lower limbs are in a state of contraction while standing, otherwise we could not maintain the upright position. Long sitting in one position should, for the same reason, be avoided.

A muscle begins contracting at one end, and continues gradually to the other. The power exerted by a contracting muscle during life is simply immense, when we con-

sider the soft and yielding nature of this structure. There are many men who can lift a thousand pounds. A few have performed remarkable feats of physical strength. Some instances are given in another chapter. The rapidity and ease with which muscles contract and move the parts to which they are attached, is also wonderful. It requires a distinct position of the muscles of the vocal organs to articulate each letter, and yet the voice is capable of uttering 1,500 letters in a minute. The fingers of the violin and piano player execute with great rapidity a wonderful variety of motions. A rapid penman makes an immense number and variety of motions of the muscles of his arm and hand, and yet may be almost unconscious of what he is doing.

MECHANISM OF THE MUSCLES.

It requires the action of a number of muscles to maintain the upright position. Any tendency to fall is counteracted by the contraction of the muscles on the opposite side. Walking is a series of half-way falls, each followed by an effort to recover. We lean the body forward, and to prevent its falling we advance one foot as a brace and make this the pivot on which the body falls or swings forward again, to be braced by the other foot. For this reason we are shorter when walking than when standing, for the body is constantly in the act of falling. The muscles use the bones as levers. According to a principle in natural philosophy, what is gained in power by the lever is lost in time, and what is gained in time is lost in power. The muscles are generally so attached to the bones as to make them levers of the third class, where there is a great expenditure of power but a corresponding gain in time. For example, take the *biceps* muscle, which may be felt on the front side of the upper arm when the

elbow is bent, and which has its fixed attachment on the shoulder, and the other extremity attached to one of the bones of the forearm, near the elbow. If this muscle were attached at the lower extremity to the wrist it would act as a power on the long arm of the lever, and great weights could be lifted; but as will readily be seen such an arrangement would be extremely cumbersome, and

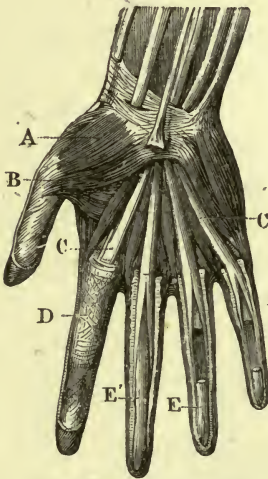


FIG. 235.—The hand, palmar aspect.

- A. Short abductor muscle of the thumb, above and outside of which is seen the opposing muscle (*opponens pollicis*).
- B. Short flexor of thumb.
- C C. Tendons of the superficial flexor of the fingers.
- D. Sheath of the tendons.
- E E. Tendons of the deep flexor.

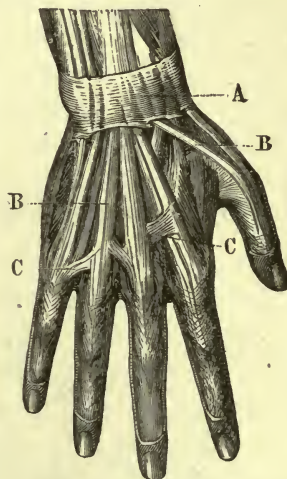


FIG. 236.—The hand, dorsal aspect.

- A. Annular ligament of the wrist.
- B B. Tendons of the common extensor of the fingers.
- C C. Tendinous expansions fastening the tendons together.

would be at the expense of time, which is the element desired in all movements of the limbs. The tendons of the muscles are in many cases, very long and pass through loops formed by bands of strong tissue similar to the ligaments of the joints. This is to secure movements at a distance from the body of the muscles, and to effect change in the direction of the motions. The muscles which move the fingers are nearly all located high up on the arm,

and act on the bones by long, slender tendons, which pass under a circular band of ligamentous tissue. By this arrangement the bulky muscles are out of the way, and the proper direction of the motion is secured by the tendons passing under this ligament, as cords on a pulley.

Muscles are increased in size and power by proper degrees of exercise and rest. Violent exercise and that which is long-continued without rest, are very injurious.



CHAPTER III.

THE DIGESTIVE MACHINE.

All organized beings require nourishment. By organized beings we mean all forms of matter endowed with life. There are two great divisions of organic nature, the vegetable and the animal. One of the chief differences between these two kingdoms is, that the vegetable finds its nourishment in the soil, the water and the atmosphere already prepared, and it simply absorbs it into itself through such organs as roots, bark and leaves, while the animal prepares its nourishment first by a process of chemical and mechanical solution, called *digestion*. This change of the food to fit it for use in building up and sustaining the animal, is accomplished in certain cavities of the body; and, although we say the food is taken into the body, it is no more inside, as far as its relations to the minute structure of the body is concerned, than anything would be inside of a tree when among its branches.

THE ORGANS OF DIGESTION.

Those parts which are directly or indirectly engaged in effecting this change on the food to fit it for becoming a part of the body of the animal, are called the *organs of digestion*. In man the principal organs of digestion are, the mouth, the pharynx, the œsophagus, the stomach and the intestines, which, taken altogether, are called the alimentary canal. The organs which are not so directly

concerned are the teeth, salivary glands, liver, pancreas and spleen.

The *mouth* receives the food, and by aid of the tongue

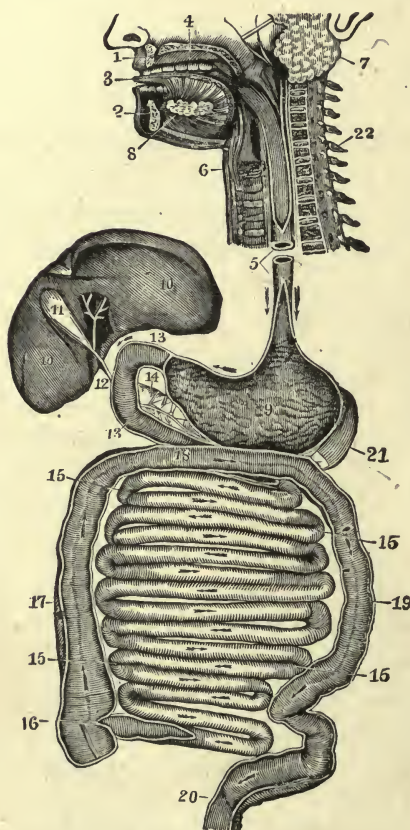


FIG. 238.—The Digestive System.

- | | |
|----------------------|--|
| 1. Upper jaw. | 10, 10. Liver. |
| 2. Lower jaw. | 11. Gall sac. |
| 3. Tongue. | 12. Biliary duct. |
| 4. Roof of mouth. | 13, 13. Duodenum. |
| 5. Esophagus. | 14. Pancreas. |
| 6. Trachea. | 15, 15. Small intestine. |
| 7. Parotid gland. | 16. Opening of small intestine into the large. |
| 8. Sublingual gland. | 17, 18, 19, 20. Large intestine. |
| 9. Stomach. | 21. Spleen. |

and cheeks, it is masticated by the teeth. While it is undergoing mastication in the mouth the food receives a fluid called *saliva*, which is furnished by certain *glands*.

located one below each ear near the angle of the lower jaw, one on each side below the lower jaw, and one under the tongue. (See fig. 238). These glands are excited to action by the stimulus of food in the mouth, and by the working of the jaws, and pour out an abundance of the saliva which moistens the food, and thus aids in its division, and prepares it for swallowing. The gland near the ear is inflamed when we have the disease called "mumps."

If it were not for the saliva many kinds of food would have no taste, since it is necessary for a substance to have taste that it should be in a state of solution. Rock candy is pure crystallized sugar, but it does not taste as sweet as syrup, since it is not readably soluble in the mouth. The saliva also keeps the interior of the mouth moist, and thus prevents the disagreeable sensation of dryness. But its most important use is a chemical one. By virtue of a peculiar chemical principle it has the power of converting the *starch* of the food into *sugar*. Starch is insoluble in water, unless it be at a boiling temperature. Sugar is soluble in water at ordinary temperatures. The starch is converted into sugar, that it may be absorbed and carried into the general circulation.

The quantity of saliva varies with the nature of the food. Dry and hard food causes greater action of the jaws, and a greater quantity is thrown out. The mere sight or odor of savory food will often excite the action of these glands, and we say, "The mouth waters." The quantity of saliva secreted in twenty-four hours has been calculated to be from one to two quarts. Under some conditions of disease, and also under the action of certain poisons, it is secreted in large quantities. Many persons know what it is to be "salivated" with mercurials used as medicines. Certain conditions of disease prevent its secretion, and the mouth becomes very dry. Anxiety and

grief also cause a diminished secretion. The saying, "The tongue cleaves to the roof of the mouth," expresses this condition.

Under the microscope the salivary glands resemble somewhat in structure a bunch of grapes. They consist of an immense number of very small sacs, or pouches, which are surrounded with a dense network of blood-vessels. The saliva is manufactured from the blood in these little sacs and conveyed from them by numerous small tubes, which unite and form larger tubes, called ducts. These ducts open into the cavity of the mouth, and pour out the saliva.

The next portion of the alimentary canal is called the *pharynx*. It is that part between the mouth and gullet, or œsophagus. It is a kind of hall, or vestibule, from which proceed seven openings, one to the mouth, one to the œsophagus, one to the larynx, or upper part of the windpipe, one to each nostril, and one to each ear. It receives the food from the mouth in the act of swallowing, and passes it into the œsophagus. The food is prevented from going into the windpipe by a kind of trap-door arrangement, which falls, and closes the entrance to the latter and allows the food to glide over it to the œsophagus. The pharynx is separated from the mouth by the soft palate, which is a fold of membrane and muscle. The first part of the process of swallowing is voluntary, but after the food is started into the pharynx the will has no control over it and it passes into the stomach without causing any sensation unless it be unnatural in quantity or character. If we undertake to breathe while a morsel of food is passing through the pharynx, portions of the food may pass into the windpipe, because the air opens the trap-door at the same time. We then say, "The food has gone the wrong way," or it is sometimes described as choking.

The word *œsophagus* is from two Greek words which mean "to eat," and "to carry." It is the name of the muscular tube which leads from the pharynx to the stomach. It is frequently called the gullet. It is about nine inches in length and is composed of two sets of muscular fibers, one set running lengthwise and another set running in a circular manner. The circular fibers contract above the morsel of food and relax below, and thus it is forced down until it reaches the stomach. This muscular movement is quite forcible. It was found by experiments on a dog that a ball, drawing by means of a cord and pulley against a weight of about seven ounces, was easily carried into the stomach. In vomiting, the action of these muscles is reversed, and the food is forced up into the mouth.

It sometimes happens that persons swallow strong acids or poisons which destroy the inner coating of the *œsophagus*, and when the wounds heal the parts become constricted so as almost or entirely to close the passage to the stomach. If the stricture is not too great, a frequent use of an instrument in the form of a probe pushed down may restore the parts, but usually these cases are very serious, and the patient is in great danger of starving to death.

The most important organ of digestion is the stomach. (See fig. 238, also fig. 251.) It may be considered as an enlargement of the alimentary canal. It is located just below the ribs and mostly to the left of the central line of the body. It varies much in size, not only in different individuals, but according to the amount of food or liquid it may contain. When moderately full it will measure twelve inches in length, and about four inches in breadth. The left extremity is larger and rounded, the right more slender and tapering. The right extremity terminates in a narrow tube which is the beginning of the intestines.

At this point there is a constriction of the parts and a fold of the mucous membrane which lines the stomach. This forms a kind of valve called the *pylorus* (gate-keeper) which prevents the undigested food from passing on into the intestines.

THE DIGESTIVE PROCESS.

The walls of the stomach consist of four coats, the second of which is composed of muscular fibers which run in various directions. By the contraction of these fibers the contents of the stomach are thoroughly mixed, the action resembling the churning of cream.

The immediate agent in stomach digestion is the *gastric juice*. It is a fluid which is secreted in small glands located in the mucous membrane, or inner lining of the stomach. This fluid dissolves certain portions of the food and effects certain chemical changes, fitting it for absorption into the circulation. The small veins in the walls of the stomach take up much of the water that is taken with the food, together with a portion of the sugar and albuminose. The action of the saliva begun in the mouth is continued in the stomach. The action of these fluids, together with the churning caused by the contraction of the muscles, reduces the food to an apparently homogeneous mass, which has received the name of *chyme*.

This is shown, however, by the microscope, to be only a partial digestion, for many parts of the food are unchanged, and only reduced to a fine state of division. Further digestion is necessary before it is fitted for nourishing the system. This takes place in the small intestines. The time required for digestion in the stomach varies from one to five hours, according to the nature of the food and the condition of the system. The chyme begins to pass into the intestine from the stomach in a

few minutes after the meal, but the greater part is not passed until toward the completion of the stomach digestion.

The chyme passes from the stomach to the small intestine, which is about twenty feet in length, lying coiled up in the central part of the cavity of the abdomen. Here the food receives the bile, a fluid which is secreted by the

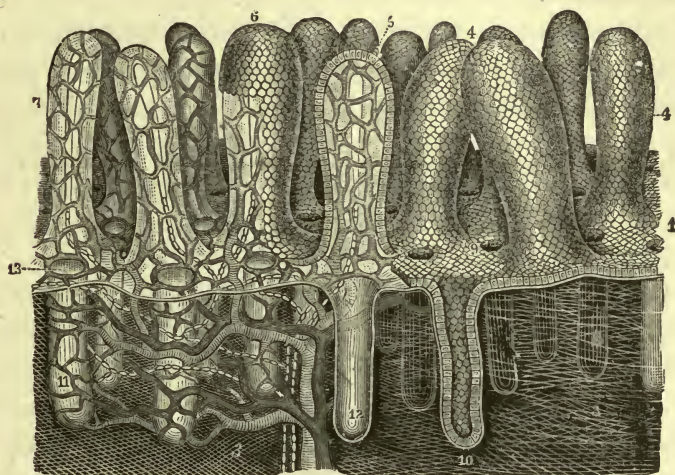


FIG. 239.—The Mucous Membrane of the Small Intestine Highly Magnified.

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|--|---|
| 1. Cellular structure of epithelium or outer layer. | 6. A villus partly uncovered. |
| 2. A vein. | 7. A villus stripped of its epithelium. |
| 3. Fibrous layer. | 8. Lymphatics or lacteals. |
| 4. Villi, covered with epithelium. | 9. Orifices of the glands opening between the villi. |
| 5. A villus in section showing its lining of epithelium with its blood vessels and lymphatics. | 10, 11, 12. Glands. |
| | 13. Capillaries surrounding the orifices of the glands. |

liver, and poured into the intestines through a small duct. It also receives a fluid from the pancreas, also a fluid from certain glands in the mucous lining of the intestine. These fluids act chemically upon the food, and complete the act of digestion. This perfectly digested food is now called *chyle*, and is of a whitish, milk-like appearance.

The chyle is absorbed mainly by numerous small vessels called lacteals, which carry it into the general circula-

tion. These lacteals terminate in numerous minute projections in the inner lining of the intestines. The projections are called *villi* (singular, villus), and there are as many as ten thousand of them to the square inch, so that the membrane presents a velvety appearance. In the cut we have shown these villi highly magnified and partially dissected to show their internal structure and the lacteals within them.

The portions of the food unfit for nourishment pass on into the large intestine, which is about five feet in length. The entire alimentary canal is a continuous tube about thirty feet in length. The intestines have considerable freedom of motion which aids the passage of waste matter.

THE LIVER.

The liver is a large glandular body, whose office is to secrete bile, which is partly a waste material, yet serves its purpose in the digestion of certain portions of the food. (For its location see fig. 251.) The liver also receives the blood which comes from the walls of the stomach and intestines charged with some of the products of digestion, and effects certain changes upon it, and then passes it into the general circulation of the body. One of the changes effected in the liver is the conversion of the *sugar* into a substance resembling starch and called *glycogen* ("sugar producer"), capable of being again converted into sugar, and distributed through the system. This seems a wise provision. The starch is insoluble. It must be converted into sugar which is soluble, before it can be carried anywhere. It is then carried to the liver and there converted into a form similar to starch for the purpose of storage, and only changed to sugar again as needed by the system. The sugar manufactured by the saliva, pancreatic juice and liver, is very similar to the glucose which is now so

extensively manufactured in this country by boiling the starch of corn with sulphuric acid.

The bile, or gall, as it is sometimes termed, is secreted in minute structures of the liver somewhat like the organs which secrete saliva, and is gathered in fine tubes which unite in one common tube called the hepatic duct. This duct empties into the small intestine in common with a duct from the gall bladder. The latter is a sort of reservoir for the bile when it is not needed for digestion. It lies closely attached to the liver (see fig. 251) and is a sac, or pouch, which has no communication with the liver except through its duct, which unites, as we have seen, with the hepatic duct, to form the common duct of the bile. As the bile then passes from the liver toward the intestine, if not needed there for digestion it regurgitates, or goes back and takes the other fork of the tube, and is deposited in the gall-bladder until wanted in the intestine. This is another example of the wonderful adaptation of means to an end.

The bile is a yellowish, or greenish-colored liquid, and very bitter to the taste. About three pounds are secreted in twenty-four hours. Its precise action in digestion is not well understood, but it has been demonstrated by experiments on animals that it is necessary to life. It acts on the fatty portions of the food and upon the membranes to facilitate the absorption of fats. It also neutralizes the acidity of the gastric juice and prepares the way for the action of the pancreatic fluid.

The pancreas, called "The Sweet Bread" in animals, is a long flattened gland lying behind the stomach (see fig. 238) and is similar in structure to the salivary glands. It secretes the pancreatic juice which resembles saliva, and has a similar action upon the starch, converting it into sugar, and also acts upon the fats and to some extent up-

on the albuminous foods, such as eggs and flesh. The fluid from the pancreas is conveyed to the small intestine through a duct which opens close to the opening of the bile duct.

The spleen, called "The milt" in animals, is a peculiar organ, about which there has been a great deal of conjecture as to its use. It is a long, flattened body, resembling the liver somewhat in appearance, and lies at the left extremity of the stomach. In some diseases it becomes much enlarged, and may be felt externally as a tumor. This enlargement, when from intermittent fever, is called "ague cake." This organ has no duct, and does not secrete any fluid, but is well supplied with bloodvessels. It is thought to act as a sort of reservoir for the surplus blood which is manufactured during digestion, and that it effects certain changes in the nature of the blood. It has been removed entire from animals without causing any particular disturbance except a marked increase in the appetite, and sometimes an unusual ferocity of disposition. It may therefore be considered as to use, not as a separate organ, but as an aid to other organs. The ancients considered the spleen to be the seat of melancholy and anger. Hence the saying, "To vent one's spleen."

THE TEETH.

The *teeth* are very important organs of digestion. In the human being there are two sets which make their appearance at different periods of life. The first set are called temporary, deciduous or milk teeth, and begin to make their appearance usually about the seventh month of childhood, and as a rule are all developed by the close of the second year. The roots of this set become absorbed and the crowns drop out, or are pulled out as the second set push their way up beneath them. It becomes

necessary sometimes to remove the temporary teeth by force, or the others will push out at the sides of the jaw, and thus appear in an irregular and deformed manner. The second set are called permanent teeth. When all developed there are 32 in number, 16 in each jaw. Each tooth consists of the crown, or that part appearing above the gums, the root or fang, which is inserted in a socket in the jaw, and the constricted part between the root and crown, called the neck. There are four kinds of teeth, differing in location, size, form and use. The four in the front part of each jaw are broad, flat and sharp, and have but one root. They are adapted for cutting, and are called *incisors*. The canine, or "eye teeth," two in each jaw, one on each side of the incisors, are sharp and conical with single long roots, and are adapted to tearing. These teeth are largely developed in carnivorous animals and are called "tusches" or tusks. There are four bicuspid, or premolars in each jaw, two behind each canine tooth. They have two points, or cuspes on the crown, hence their name, and have usually a single root with a groove showing a tendency to become double. There are six *molars* or grinders in each jaw, located three behind the bicuspid on each side. These are large, usually called "double teeth," have several cuspes, and from two to five roots. Those in the lower jaw usually have two roots, and those in the upper, three.

Of the temporary teeth, four are incisors, two canine, and four molars in each jaw. The last molars of the permanent set do not appear until about the 20th year, hence they are called "wisdom teeth."

The time of the appearance of the teeth is very irregular, but by comparing a great many cases the following average time has been made out: For the temporary set: The 7th month, two middle incisors; 9th month, two lateral

incisors; 12th month, first molars; 18th month, canine; 24th month, last molars.

For the permanent set: Between 6th and 7th year, first molars; 7th year, two middle incisors; 8th year, two lateral incisors; 9th year, first bicuspid; 10th year, second bicuspid; 11th to 12th year, canine; 12th to 13th year, second molars; 17th to 21st year, wisdom teeth.

In structure a tooth consists of a solid part and an internal cavity containing a pulpy substance consisting mostly of vessels and nerves. The main part of the solid substance is called ivory or *dentine*, and resembles bone. The crown is covered with an extremely hard substance called *enamel*. It is the hardest substance in the body, harder than iron or most metals. The root is covered with a hard substance called *cement*.

In consequence of the jaw being too narrow it is sometimes necessary to remove one or more of the permanent teeth to prevent crowding and make them grow regular. Some persons have teeth naturally so good that they never decay but wear down to the gums, while the teeth of others decay before they have reached their growth. Teeth may be extracted and replaced, even be removed from the jaw of one person to another and become solid and tight as before. If the enamel becomes cracked or removed, the tooth generally soon decays.

FOOD.

By food is meant all solid and liquid substances which are capable of being converted into a condition ready for absorption for the building up of the system, and the supply of waste, and for the manufacture of heat. What is meant by waste as applied to the system? Simply this, the body is constantly being built up by the accession of new material, and constantly being torn down by the re-

removal of old material. This action goes on in the *cells* which are the minute structures which lie at the foundation of all animal and vegetable growth. There are plants which consist of a single cell, but most all organized beings are made up of an immense number of cells. A single cell may be described as a globular sac, or bag containing a fluid in circulation. This fluid may pass from one cell to another through the walls of these sacs. This is the typical form of the cell, but under various circumstances as pressure upon each other, they are much modified in form. The body when in health is like a building where millions of unseen hands are constantly carrying away particle by particle of the material of which it is built, and replacing it by new material of the same kind. When the building up process exceeds the tearing down process then the body increases in weight; when the reverse is the case it diminishes in weight. An average-sized adult consumes about a ton of food in a year and throws off as waste matter an equal amount.

It is an old idea that the entire body is renewed every seven years by this process of waste and repair. But the time cannot be estimated. It varies in different individuals and in the same individual at different times. It varies widely too in different tissues of the body, the softer structures being renewed much more frequently than the harder and more dense structures. Thus it is said that the lining membrane of the glands of the stomach is renewed several times during the act of digestion, while the enamel of the teeth perhaps is not renewed more than once in a lifetime.

THE PRODUCTION OF HEAT.

What is meant by the manufacture of heat? The body must be maintained at a certain temperature. This tem-

perature in man and all the higher animals is nearly the same under all conditions of climate, about 98 degrees of Fahrenheit's thermometer. Men have gone where the temperature was low enough to freeze mercury, 40 degrees below zero, and again into ovens heated to 260 degrees, or much greater than that of boiling water, yet the effect on the temperature of their blood was scarcely perceptible.

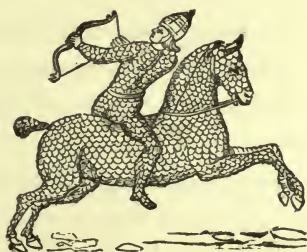
We know that a heated body, as a piece of iron, rapidly cools when placed in an atmosphere cooler than itself. So a human body is constantly giving off heat. How is this constant temperature of 98 degrees then, kept up? It is by the chemical action of the materials which compose the body. Chemists can show us that this action is quite similar to that which takes place where wood or coal are burned in the stove. The principal part of wood, coal and other fuel is *carbon*. The result after burning is principally a gaseous substance called carbonic oxide. The principal material of a great part of our food, as sugar, starch, oils and fats, as well as much of the material of the body, is also carbon. The waste material given off from the body is principally carbonic oxide.

The process of combustion in the body is not as simple as that of fuel burning in a stove, but the final results, the production of carbonic oxide accompanied with generation of heat, are the same. It is not certain whether any of the material of the food is directly burned in the blood, or that it first enters into and becomes a part of the tissues, and is then burned.

Foods, then, may be divided into two general classes as respects their nutritive value. First, the tissue-making or *albuminous*, which are used principally to supply the material which forms bone, muscle, nerve, etc., and to supply the waste which is constantly going on. The principal albuminous foods are albumen proper, which is

found almost pure in the white of eggs, casein, found in milk, fibrine, the principal part of lean meat, vegetable casein, found in beans, peas and other vegetables, and gluten, found in all grains. Second, the heat-making or *carbonaceous*, which are soon disorganized in the system, and contribute mainly to the supply of heat, by undergoing combustion. The principal carbonaceous foods are starch, found in all grains in abundance, and in many fruits and vegetables, sugar, gum, and oils and fats.

Water is necessary to life, as it is the great means of conveying the nutritive material to the various parts of the body, and in conducting away the waste material. Men may live a long time without food, but if deprived of water and food both, they very soon die. The greater part of the body is composed of water. If a man weighing 140 pounds were placed in an oven and thoroughly dried, his body would weigh only about 12 pounds. This shows the proportion of water in the human body. The greater part of our food is composed of water, so that it is possible for a man to exist for an indefinite period without drinking water, if he chooses the proper kind of food.



CHAPTER IV.

THE CIRCULATORY SYSTEM.

The blood is carried by a system of tubes, called *arteries*, from the heart to all parts of the body, and back again to the heart, by another system of tubes, called *veins*. This is what we mean when we say the blood circulates.

The *heart* is a hollow muscular organ, which acts as a pump in sending the blood through the body. It is of a conical form, the broad portion directed upward, backward and toward the right, the point, or apex directed downward, forward and toward the left, striking the space between the fifth and sixth ribs about two inches below the left nipple. It is partly surrounded by the lungs, and the greater part of its bulk lies to the left of the middle line of the breast-bone. (See fig. 251.) It is usually about 5 inches in length by $3\frac{1}{2}$ in breadth, and $2\frac{1}{2}$ in thickness, and weighs from eight to twelve ounces. Some have compared it in size to the closed fist of the individual. It is double, that is, is divided into two halves by a partition. These halves each contain two cavities, those on the one side having no communication with those on the other. The upper ones are called *auricles*, and the lower ones *ventricles*. The auricles communicate with the ventricles by openings, which are guarded by valves. Surrounding the heart is a membrane, which is in the form of a shut sac. This sac contains a fluid. The outer wall of this sac is attached to the walls of the chest and the inner to the

heart. This arrangement is well adapted to protect the heart from friction and jarring. It is sometimes inflamed, then the fluid disappears, and a rasping sound is heard as the two walls of the membrane rub together. This sac is filled with an unusual quantity of fluid in "dropsy of the heart."

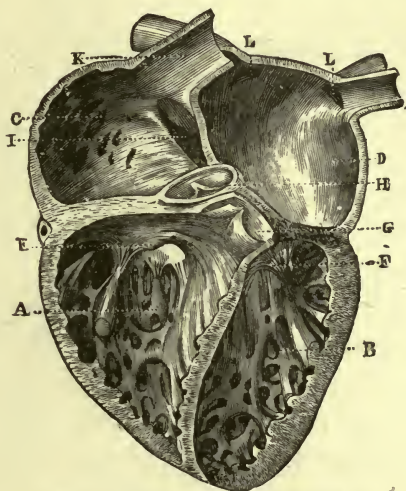


Fig. 241.—Transverse section of the heart.

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| A. Right ventricle. | G. Origin of the pulmonary artery and sigmoid valves. |
| B. Left ventricle. | H. Origin of the aorta, and valves. |
| C. Right auricle. | I. Orifice of inferior vena cava. |
| D. Left auricle. | K. Superior vena cava. |
| E. Right auriculo-ventricular orifice and tricuspid valve. | L, L. Orifice of the pulmonary veins. |
| F. Left auriculo-ventricular orifice and mitral valve. | |

The muscular fibers forming the substance of the heart are intricately interlaced. The surfaces of the cavities are lined with a smooth *serous membrane*, the folds of which form the valves.

THE ARTERIES.

The arteries are cylindrical elastic tubes which convey the blood from the heart to all parts of the body. There are two classes of arteries, the *systemic* and the *pulmonic*,

the former carrying the pure blood from the left ventricle to all parts of the body, the latter carrying the blood from the right ventricle to the lungs, for purification. The pulmonary artery proceeds from the right ventricle, enters the lungs, and dividing and sub-dividing, finally terminates in a vast number of minute tubes, called *capillaries* (hairlike vessels). The systemic arteries take their origin in one main trunk, the *aorta*, which rises from the left ventricle, arches toward the spinal column, along which it descends to the lower part of the trunk. Just as it leaves the ventricle it gives off a branch, which supplies the heart itself. The arch gives off several branches, which supply the head and upper extremities. The main trunk gives off numerous branches in its course to supply the internal organs. The lower extremity divides into two trunks, each of which again divides, one branch extending down each lower limb, and one supplying the pelvis, or lower part of the trunk. The systemic arteries also terminate in capillaries.

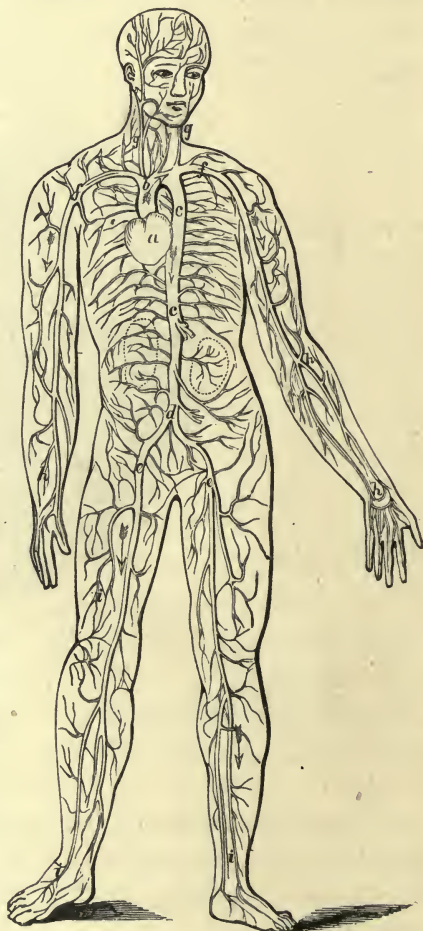


FIG. 242.—Arteries of the Body.

(a), Heart; (b, c, c'), Aorta, or largest artery; (f), Subclavian artery; (g), Carotid artery.

The branching of the arteries is precisely like the branching of a tree, except that in many places the branches join each other again. This is a wise arrangement, as by this means a part may be supplied with blood by more than one channel, so that if one be cut off the other may serve the purpose. This fact is of peculiar interest to the surgeon, as in case he must tie an artery, the circulation is kept up by this communication of the branches. The larger trunks generally run very *deep*, keeping close to the bones. They are thus protected from injury. There are several places, however, where they for a short distance, come near the surface. It will be noticed, however, that whenever they come near the surface, it is always on the inner side of a limb, or in a hollow place, where there would be less danger of receiving blows. The arteries which come near the surface may be felt pulsating.

The radial artery on the inner side of the wrist is usually known as "the pulse." Arteries may easily be felt pulsating, as follows: In the neck, just below the angle of the jaw; on the temple, just in front of the ear; by pressing the finger on the lower jaw, about half-way between the chin and ear; by taking the outer portion of the upper lip between the thumb and fore-finger; just behind the knee. The throbbing of a felon is due to pulsation of the artery in the finger, the parts being rendered very sensitive by the inflammation.

Arteries are always found empty after death, and for this reason it was long thought that they contained air. They are empty because the blood is forced on into the veins by the elasticity of the walls of the arteries. When an artery is cut across, it appears open, like the end of a rubber tube. When cut during life the blood flows in jets, or impulses corresponding with the pulsations of the heart.

An artery consists of *three coats*, the outer of which is the strongest. If a thread be tied tightly around an artery, the inner and the middle coats will be severed, while the outer one will remain uninjured. The middle coat contains some muscular fibers, which, by their contraction, lessen the caliber of the tubes. The latter is especially the case in the small arteries, as the muscular fibers are more numerous. Arteries are sometimes the seat of disease. The walls become weakened by a deposit of lime-like material, or by a fatty degeneration. Sometimes one of the coats gives way, allowing the blood to penetrate between the coats, where it bulges out, often forming tumors of great size, which are in danger of bursting, and causing death by bleeding. The remedy in such cases is to cut down to the artery above the tumor, and tie it. Lives have often been saved by this operation.

THE VEINS.

The *veins* are also tubular vessels, distributed in a manner similar to the arteries. They return the blood from all parts of the body to the heart. There are, as with the arteries, two classes, *pulmonic* and *systemic*. The pulmonic veins consist of four trunks, which, proceeding from the lungs, where they are made up of a great number of branches, enter the left auricle, and return the blood from the lungs in a purified condition. The systemic veins unite in two great trunks, one coming along with the aorta, and one descending from above the heart, both entering the right auricle. As the arteries end in capillaries, the veins begin as capillaries. Like the arteries, the veins have three coats, but the middle coat is comparatively weak. They are not elastic, and collapse when empty. The larger trunks accompany the arteries, sometimes inclosed in the same sheath with them. The

branches of the veins join in a manner similar to the arteries, and are altogether more numerous. When a vein is cut the blood flows in a steady stream. The inner coats of the veins have folds, which form *valves*, so arranged that the blood will pass readily in one direction, but not in the other. Veins are also sometimes the seat of disease, being subject to inflammation and a peculiar swelling or knotting, known as "varicose veins."

A peculiarity of the venous circulation is that all the veins of the stomach, intestines and spleen unite in one common trunk, called the *portal vein*, which enters the liver, and branches through its substance. This blood is then collected by other veins, which unite in three trunks called hepatic veins, which empty into the large trunk ascending to the heart.

The *capillaries* are, as we have seen, minute tubes, which are the termination of the arteries, and the beginning of the veins. They are found in nearly every tissue of the body. Their diameter is usually about $\frac{1}{3000}$ of an inch, and they are distributed so thickly that you can scarcely put a fine needle anywhere, without striking one or more of them.

COURSE OF THE BLOOD.

Having briefly described the organs of circulation, let us note the process and the course the blood takes in its rounds. The blood having performed its office in the capillaries of the system, passes from thence into the small veins, from these into the larger trunks, like small streams uniting to form a large river. These large trunks, one bringing the blood from the lower half of the body, the other from the upper half, both empty their contents into the right auricle of the heart, like unto a great sea. From the auricle the blood passes through an opening in the partition down

into the right ventricle. Then, by the contraction of the ventricle, it is forced into the pulmonary artery, being prevented from returning into the auricle by a valve which opens downward. From the pulmonary artery it passes into the arteries of the lungs, which distribute it to every part of the lung substance. Here it comes in

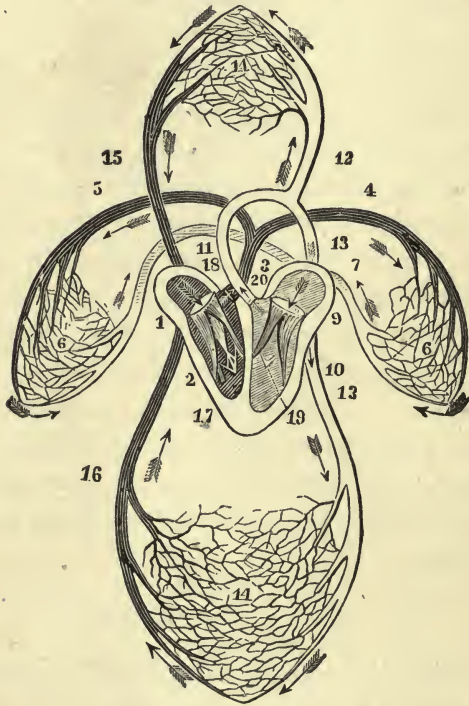


FIG. 243.—Purification of the Blood.

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|----------------------------|--|
| 1. Right auricle. | 12, 13, 13. Branches of aorta. |
| 2. Right ventricle. | 14, 14. Represent capillaries of the body. |
| 3, 4, 5. Pulmonary artery. | 15. Vena cava descending. |
| 6. Capillaries in lungs. | 16. Vena cava ascending. |
| 7, 8. Pulmonary veins. | 17. Tricuspid valve. |
| 9. Left auricle. | 18. Semilunar valves. |
| 10. Left ventricle. | 19. Mitral valve. |
| 11. Aorta. | 20. Semilunar valves. |

contact with little air-sacs, and from the air it receives oxygen, and gives back to it carbonic oxide, whereby it is purified, and is now received by the pulmonary veins and

conveyed to the left auricle, from which it descends into the left ventricle, which contracts upon it, forcing it into the aorta, and from thence it is distributed to all parts of the system again. When the left ventricle contracts, the blood is prevented from going back into the left auricle by a *valve* opening into the ventricle. There are also valves in the pulmonary artery as it leaves the right ventricle, and similar ones in the commencement of the aorta. These prevent the blood from regurgitating or flowing back into the ventricles when the latter relax.

It will be seen that the term artery is applied to any vessel carrying blood *from* the heart, and the term vein to any vessel carrying blood *to* the heart. In the systemic arteries and the pulmonary veins the blood is bright *red* or *scarlet* in color. In the systemic veins and pulmonary artery it is darker in color. The blood going from the right ventricle to the lungs and back again to the heart, is called the pulmonary circulation. That from the left ventricle to the body and back again to the right auricle, is called the systemic circulation. That part of the systemic circulation before described as the blood passing from the digestive organs through the liver, is called the portal circulation.

The blood cannot be seen circulating in man, but if the delicate, transparent web of a frog's foot be placed under the microscope the circulation may be seen, and it is a sight as beautiful as it is wonderful. It may be observed also in the tail of the tadpole, and in the ear of the rabbit. Under a high power the corpuscles or minute cells of the blood may be distinguished as they roll along threading their way as though possessed of intelligence through the intricate network of the capillaries.

THE CAUSES OF CIRCULATION.

Although the heart is a great pump which sends the blood into the arteries, its action does not seem to account for all the phenomena of circulation. In many of the lowest animals, a heart is wanting, or at least there is nothing like the pumping action we find in man and the higher animals, yet the blood circulates freely. The sap circulates in a tree, and there is nothing approaching a heart in the vegetable structure. The heart in man is no doubt the main cause of the circulation, but many other causes come in to aid. The *elasticity* of the arteries is one cause. As the blood is forced into them by the heart's beat their walls expand but immediately contract again, forcing the blood on, as it cannot return on account of the valves. The valves in the veins all opening one way toward the heart, assist much in driving the blood onward. This action of the valves is somewhat like that which takes place when a head of bearded wheat is pushed up the sleeve. By the movements of the arm it travels up to the shoulder, being prevented from going back by the barbs on the beards, or awns. The movements of the muscles exert pressure on the veins, and thus drive the blood through these valves. *Capillary attraction*, or that force which causes liquids to rise in minute tubes, no doubt acts as a cause in moving the blood. This force is shown in a lamp wick, the oil is carried up to the flame by capillary attraction. The change in the blood in the lungs, part of its contents being thrown off into the atmosphere, and the change in the tissues whereby part of its substance is used in building up the body, also probably have something to do with the circulation.

Chemical affinity of the blood for various tissues aids the forward movement of the blood. *Osmic* action, that

is, the affinity of one fluid for another when separated by a thin membrane, also aids the circulation. The thicker fluid seeks the thinner till the same density is reached.

MOTIONS OF THE HEART.

The motions of the heart are peculiar, and give rise to certain sounds which may be heard on applying the ear to the chest. The two auricles contract at the same instant driving the blood into the ventricles which at this moment are relaxed. Then the two ventricles contract while the auricles relax. The blood is thus driven into the arteries. This alternate contraction and relaxation is called pulsation, or we say the heart beats. These movements follow each other in quick succession so that a wave-like motion seems to extend from the one end to the other. When the ventricles contract the heart is tilted on itself so that the apex strikes against the walls of the chest. The pulsations average in the adult about 70 per minute. At birth the rate is 130 to 140 per minute. In old age it is less than in middle age. It is more frequent in women than in men, less frequent during sleep than when awake, more frequent during exercise, and after eating. The rate varies greatly under different diseased conditions. It has been known to be as low as 20, and as high as 160. As the pulse beats at the same time the heart does it is taken as the measure of the heart's action.

The sounds of the heart are two during each pulsation. The first is a dull thud caused by the contraction of the ventricles, the striking of the apex against the chest and the opening of the valves of the arteries with the rush of blood from the heart. This sound is followed by a short interval of silence, then comes the second sound which is sharp and sudden, and caused by the shutting of the valves in the arteries. These sounds have been compared to a pro-

nunciation of the syllables *lubb*, *dup*. It is important that the physician be familiar with these sounds in a state of health as a departure from the natural sound is an indication of disease of the heart.

The heart is the seat of a number of diseases, none of which are of very frequent occurrence. They are usually fatal and often result in sudden deaths, but sudden deaths are not always attributable to heart disease.

There have been cases of rupture of the heart. This could not occur under natural conditions, but sometimes the walls of the heart become weakened by fatty degeneration, and give way under the muscular exertion. The expression, "to die of a broken heart," is therefore not always figurative.

Although the heart, being an *involuntary muscle*, beats independent of the mind's action, yet it is so connected by means of nerves with the brain that it is influenced by various sensations, and mental and moral impressions. The arteries pulsating in unison with the heart, partake of this influence. The arteries may also be influenced by nervous sensations, producing contraction or relaxation of the muscular fibers of their coats, independent of the heart's action. Examples of this modification of the heart's action, due to mental causes, are numerous. Fright, anxiety, mental excitement of any kind, may cause the heart to beat more rapidly. The expression, "My heart was in my mouth," is only one way of expressing the feeling produced by the rapid beating of the heart. The fact that the heart responds to the various emotions of the mind, no doubt led the ancients to believe that the heart was the location of the affections.

The amount of work done by the heart is truly enormous. During the life of a man seventy years of age, it has dilated and contracted over two thousand million

times, and has moved more than a quarter of a million tons of blood. The force which it exerts is equal to that which would raise its own weight 20,250 feet in an hour.

THE BLOOD.

The body of a man of average size contains about ten quarts of blood, which is equal to about one-eighth of the entire weight of the man. The blood is a little heavier than water, and is of a bright scarlet color in the systemic arteries, and of a little darker color in the systemic veins. It is slightly salty to the taste, and has an odor peculiar to itself. Blood, when freshly drawn, consists of a transparent liquid, called *plasma*, or liquor sanguinis, in which floats immense numbers of little bodies called blood-cells,

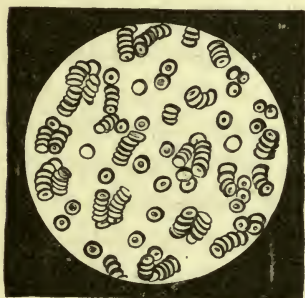


FIG. 244.—Blood seen under the Microscope.

blood-disks, globules, or *corpuscles*. This fact is shown only by the microscope, for the number of these corpuscles is so great that they give color to the blood, and in quantity it is not transparent to the eye, but red, as above described. But if a small drop be placed upon a piece of glass, and the surplus blown off, so that a mere stain is

left, and this be examined by a microscope of tolerably high power, a vast number of little circular bodies will be seen floating in a transparent liquid. These cells are of two kinds, described as *red* and *white*. Those described as red, however, when seen singly, have only a faint reddish tinge, but when many are collected together, they appear as a red mass, and they give the characteristic color to the blood. A red corpuscle, when viewed from different positions, is seen to be in the form of a circular cracker or biscuit, which is hollowed out a little in the middle on each

side. When spread upon the glass, they often show a tendency to collect in rows, appearing like so many coins leaning against each other. Small as they are, they have been measured, and found to be about $\frac{1}{3500}$ of an inch in diameter. Some idea of their minuteness may be obtained when we say that, were they laid side by side, touching, but not overlapping, it would take more than twelve millions of them to cover a square inch of surface. In some of the lower animals, as the frog, snake and turtle, the red cells are oval in form, and much larger than in man. Indeed, the size of the cells bears no proportion to the size of the animal. In the elephant and whale they are a very little larger than in man, while in the toad they are nine times as large, and in the proteus, a little animal resembling a lizard, they are sixty-four times as large as in man, and may be seen with a common pocket magnifying glass.

The *white corpuscles* are a little larger than the red, and are usually globular, but vary much in form; and under the microscope, in water at the temperature of the body, they may be seen to change their form and exhibit spontaneous movements, as though possessed of life. Under certain conditions of inflammation they have been observed to escape from the blood-vessels, by making their way through the walls of the vessels. This is called "migration of the white corpuscles." Their origin, nature and use are not yet thoroughly understood, and they have been the subject of much investigation and discussion, in connection with the explanation of inflammation. The proportion of red and white corpuscles is variously estimated. According to some authorities there are 300 or 400 red to one white, in a healthy state. In certain forms of disease the number of white corpuscles is increased.

The blood of oysters and some other species of low organizations is white. This leads many to entertain the idea that such animals are bloodless. In fact, no species of animal could live without blood.

TESTS OF BLOOD.

The question may arise, Is it possible to distinguish with a microscope the blood of a man from that of any other animal? The answer would be, No, not from *any* other animal, but it is possible to distinguish it from that of *some* animals. As will be seen, this fact has a practical bearing. Suppose a man is accused before a court of justice, of murder, and the circumstantial evidence of blood being found on his clothes or on weapons used by him, was turning the scale against his innocence. If this blood were that of a frog, a snake, a turtle, a fish, or some such animal, the microscope would prove it not to be that of a human being, by the oval form of the corpuscles, but if it were the blood of a dog or other domestic animal, the microscope would reveal no essential difference. Under certain conditions *crystals* form in the blood after it has been removed from the body. These crystals have several forms, which appear in different animals, but the same forms occur in man as are found in many other animals, so that it cannot be used as a test of the blood.

When blood has stood about ten minutes after having been drawn from the body it clots, or coagulates. Heat somewhat favors coagulation, and cold retards it. The contact with rough surfaces also favors it as well as the stoppage of circulation in the vessels. But if a portion of an artery be tied and then cut out with the blood still in it, coagulation will not take place for some time. This change consists of a separation of the blood into two parts,

a clot, or coagulum of a jelly-like consistence composed of fibrin and the corpuscles, and a thin fluid called serum, consisting mostly of water holding mineral salts in solution with some albumen. The fibrin of the blood may be separated before coagulation takes place by whipping it with twigs. It is a stringy, tenacious substance, and differs very little from the fibrin which is the main constituent of the muscles.

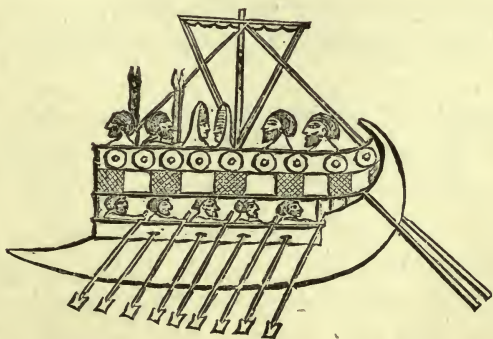
The cause of coagulation is not certainly known. It is evidently due to the appearance of fibrin, but why this should take place out of the body and not while circulating, we cannot say. It is probable that fibrin is constantly being formed in the living blood, and as constantly being used in building up tissues and supplying waste. (Draper.) The blood sometimes forms clots within the living body. This is the case when there is an injury to, or a disease of inner coats of the vessels. These clots often cause serious trouble or death by plugging up the main channels of the circulation. The coagulation of the blood after it leaves the vessels is of peculiar advantage. When a blood-vessel is wounded if it were not for the coagulation of the blood in the wound a man might bleed to death from a very small wound, but the clotting of the blood in a short time clogs the open mouths of the vessels and arrests the bleeding. This arrest will take place even in quite large vessels, and more especially if the wound is torn and jagged, since a rough surface seems to favor coagulation.

THE BLOOD AS A NUTRIENT.

The blood is the great storehouse of material from which the body is built. All the material of the body previously existed in the blood. The saying, "The blood is the life," is literally true. The particular use of the red cells is thought to be to carry oxygen to the various

tissues of the body. It is thought by some that the white cells are an earlier stage of the red cells. The fact that they are more numerous after digestion of food and resemble closely the cells in chyle and lymph, and the cells found in pus, would lead to this conclusion. The life of a blood cell is extremely short. They are constantly dying, and new ones are constantly being developed. Draper says, "At every beat of the pulse, nearly *twenty millions* of these organisms die."

When medicines or poisons are inserted directly into the blood, their effect is much more rapid and powerful than when taken into the stomach. When inserted under the skin, by hypodermic injection, as it is termed, medicine acts more rapidly because it comes in close contact with an immense number of capillaries which absorb and carry it almost directly into general circulation. The poison of the rattlesnake's bite, and that from the poisoned arrows used by some savage tribes, owes its rapid action to the fact that it is inserted almost directly into the blood. The lymphatics, however, are the principal organs of absorption throughout the system.



CHAPTER V.

THE LYMPHATIC, OR ABSORPTIVE SYSTEM.

It is known that the nutritious elements of the food pass from the *alimentary canal* into the blood-vessels, and thus reach their destination in the tissues. It is also true that substances rubbed on the skin are taken into the blood, and according to their nature produce injurious or beneficial results. Mercury rubbed on the feet may affect the salivary glands in the mouth. A man may be nourished for some time by being immersed in soup. A person bathing will have his thirst assuaged although he takes no water into his stomach, or mouth. How are these effects produced? We have seen that the veins take in or absorb through their walls certain substances, but there are other organs whose special duty it is to absorb material and convey it from one part of the system to another. They are also engaged in removing the worn out or used up material. Those organs are called *lymphatics*, or *absorbents*.

They consist of lymphatic vessels and lymphatic glands. The lymphatic vessels are exceedingly delicate tubes of a nearly uniform thickness, having a knotted appearance due to valves in their interior. They are found in nearly every part of the body. Those of the small intestine are called *lacteals*, before mentioned as the agents in collecting the chyle. The lacteals and all the lymphatics of the body except those of the right side of

the head, neck and chest, empty into one main trunk called the *thoracic duct*, which is a tube about the size of a goose quill and 18 or 20 inches in length, lying along the spinal column in the cavity of the body, and emptying itself into a large vein near the neck. The remainder of the lymphatic vessels converge to a short tube which empties into the vein on the opposite side of the neck.

These vessels, with the exception of the lacteals, contain *lymph*, a colorless fluid. The lacteals contain a milky-white fluid, the *chyle*, the only difference between

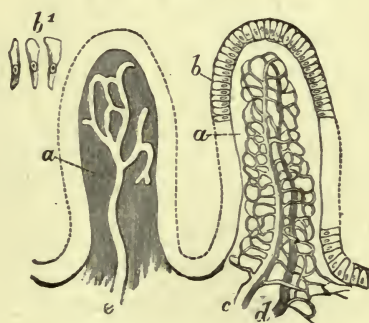


FIG. 247.—Villi of Intestine.

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|------------------------------|----------------------------------|
| (a). Network of capillaries. | (d). Vein. |
| (b). Covering of epithelium. | (e). Lacteal. |
| (c). Artery. | (b¹). Separate epithelial cells. |

(See also fig. 239).

lymph and chyle being that the latter contains minute globules of fat, which give it the white appearance.

The *lymphatic glands* are small bodies, varying from the size of a hemp-seed to that of an almond, situated in the course of the lymphatic vessels. They are very numerous in the space under the arm, and in the groin. The lymphatic vessels enter the glands, divide into several branches, which again unite on leaving them. The albuminous material of the lymph and chyle is changed to fibrin in the lymphatic glands. The principal use, then, of the lymphatics, including the lacteals, is to

collect the albuminous material, both that which comes into the chyle from the food and that which comes from the worn out tissues, convert it into fibrin in the lymphatic glands and empty it into the general circulation, to be used in building up and repairing the tissues. A secondary use is, as we have seen, to convey water, food and other material in special cases into the general circulation from the surface of the body, and from the various cavities. Parts which are no longer of any use are absorbed, as the roots of temporary teeth, the surplus amount of material in healing a bone, etc. The substances of tumors and abnormal growths are often absorbed. This is what is meant when we say the "tumor scatters." Medicines which aid this process act by stimulating the absorbents to greater activity. Continued pressure on a part causes activity of the absorbent vessels, as in case of the permanent teeth pressing upon the roots of the temporary set. The aorta sometimes becomes partly ruptured, forming a tumor, or aneurism, as it is called, and the enlargement of this tumor, producing pressure on the breast-bone, causes absorption of the bone at that place, allowing this tumor to appear on the surface of the body. Pounding a boil has been recommended as a means of cure, by causing its contents to be absorbed, instead of waiting for the matter to be discharged externally. The majority of persons, however, would prefer the disease to the remedy.



CHAPTER VI.

THE RESPIRATORY SYSTEM, OR BREATHING APPARATUS.

The blood not only furnishes the material from which the system is built, but it is the great quickening and vivifying agent of the body. Deprive a part of blood, and it rapidly assumes the condition of dead matter. In this sense "the blood is the life." But its own life is extremely short. Unless constantly aerified, or purified by the air in the lungs, it rapidly becomes a poison to the system. Hence, life soon departs when breathing ceases.

The organs of respiration are the *lungs*, assisted by the larynx, trachea, diaphragm, and the ribs and muscles of the chest. There are two lungs, a right and left, connected together by the bronchial tubes, which are the divisions of the trachea, or windpipe. Between the two lungs lies the heart, which is almost entirely covered by them. (See fig. 251.) The large blood-vessels, a portion of the œsophagus, some important nerves, and the thoracic duct. Each lung is conical in form, the apex projecting a little above the first rib, and the base resting on the diaphragm, a membranous partition which separates the lungs and heart from the liver, stomach, and other organs of the abdominal cavity. The right lung is the larger. They are heavier in proportion to the body in the male, than in the female. They will float in water, and at birth are of a pinkish-white color, growing somewhat darker as age advances.

To get an idea of the structure of the lungs, imagine a tree with its top hanging downward. Let it be divided first into two main branches, each of which divides and sub-divides into an immense number of small branches, each of which finally terminates in a knob or bunch. Suppose the trunk and each branch to be small tubes, and the terminal knob a little sac. The trunk of this

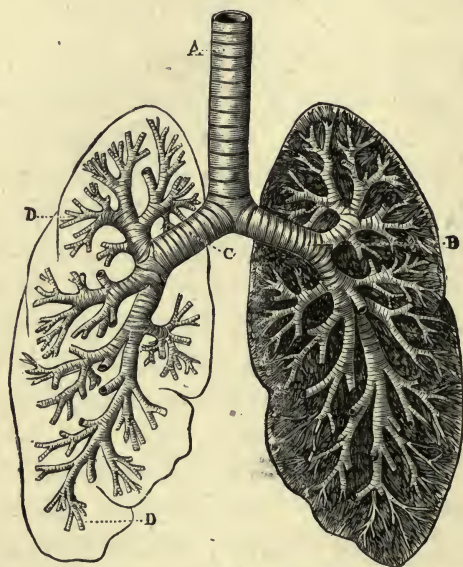


Fig. 249—Section showing the ramifications of the bronchi in the lungs.

A. Trachea. B, C. Bronchi. D, D. Bronchial tubes.

tree will represent the trachea, or windpipe; the larger branches the bronchial tubes, and the smaller branches, little sacs, a part of the substance of the lungs. Now imagine another tree, with a shorter trunk, but with as many branches intimately intertwined with the branches of the first, the terminal twigs winding around the knobs, and the whole tree to be a system of tubes containing a bright red fluid. This will represent the pulmonary artery and its divisions. Next imagine four trees which branch and

intertwine with the other two, their terminal twigs also winding around the knobs of the first, the whole forming almost a solid mass of minute tubes. Let these trees be small tubes, containing a dark-red fluid. These will represent the pulmonary veins. Now imagine a fine substance, like spider's web, permeating all these tubes and binding them together, but yet leaving room for a much finer set of tubes, and a set of delicate cords. This fine substance will represent the connecting tissue, the fine tubes the lymphatics, and the cords the nerves. Now you have the substance of the lungs entire, except a thin, delicate membrane, which covers the whole as a sheath.

RESPIRATION.

It is in these little sacs, or lobules, as they are called, that the air is brought in close proximity to the blood, yet not in contact with it, for there is a delicate membrane between, through which the oxygen of the air during inspiration passes to the blood, and the carbonic oxide of the blood passes to the air, and is given out in expiration. *Respiration*, or breathing, then, consists of two acts, *inspiration*, or breathing in, and *expiration*, or breathing out.

Inspiration consists of an elevation of the ribs and breast bone by the action of proper muscles, while at the same time there is a depression of the diaphragm (see fig. 251), and a relaxation of the muscles of the abdomen, all of which actions cause the cavity of the chest to enlarge. The air then enters the lungs through the nose or mouth, and windpipe, as into a pair of bellows, by atmospheric pressure. When a deep breath is taken the air may penetrate to the remotest parts of the lungs, reaching all the little lobules.

Expiration consists in a relaxation of the muscles

of the chest, allowing the ribs and breastbone to fall and the contraction of the abdominal muscles, causing the diaphragm to rise, thus lessening the cavity of the chest. There is always a portion of air which cannot be expelled by the most forcible inspiration. This is called *residual* air. The amount moved at each respiration is called the *tidal* air. There is a large quantity which can be expelled by a forced expiration. This is called the *reserve* air. A considerable quantity also can be taken in by a forced inspiration. This is called *complemental* air. The relative amounts of these different portions, as well as the entire lung capacity, is shown in the following table :

Residual air.....	100 to 130 cub. in.
Tidal "	20 to 30 " "
Reserve "	90 to 100 " "
Complemental air.	90 to 100 " "
Total lung capacity	300 to 380 " "

The residual air slowly diffuses or mixes with the reserve air, and while it remains about the same in quantity, it is exchanged slowly for fresh air, and its quality is not deteriorated.

About every fifth inspiration is more forcible than the others. The presence of the residual air prevents sudden variations in the temperature, kind, and amount of air inhaled.

In the healthy adult the average number of respirations per minute are 18. The number rarely exceeds 25, or falls below 14. They are increased by food, exercise, moderate cold, stimulating medicines, and disease; diminished by moderate heat, inactivity, depressing medicines, starvation, and disease. They are more frequent in children than in adults, and in women than in men. A man will breathe about 9,000,000 times in a year. There will be carried through the lungs about 125,000 cubic

feet of air, purifying about 5,000 tons of blood. In 24 hours the lungs exhale two pounds of *carbonic oxide*, which is the product of the combustion of nine ounces of carbon. The force produced by this burning is equal to that of one-eighth of a horse-power acting continuously for 24 hours.

Sighing is a deep inspiration, with rather forcible expiration, and is caused by mental emotions. Yawning is similar to it, caused by a close atmosphere or other depressing influence. Both seem to be efforts of the system to gain more oxygen. Coughing and sneezing are spasmodic efforts to drive out some irritating cause in the air passages. Hiccough is a spasmodic action of the diaphragm.

THE TRACHEA AND THE VOCAL ORGANS.

The *trachea*, or windpipe, is a cylindrical tube, made up of rings of cartilage connected by a membrane. At the back part the rings are not complete, the space being filled by a membrane. It extends from the upper part of the neck to the lungs, and is about $4\frac{1}{2}$ inches in length. In structure it is peculiarly adapted for the purpose designed. If it were composed entirely of membrane, or a yielding substance, it would collapse, and prevent the air from entering. If entirely of cartilage, or hard material, it would not bend laterally and accommodate itself to the movements of the body. The combination of hard and soft parts secures an open tube, with the necessary flexibility.

The *larynx* is the special organ of voice, and is a kind of box or short tube which forms the upper part of the windpipe. It lies close to the skin in the middle of the front part of the neck, and may be felt, and in lean persons seen, as a lump or protuberance known as "Adam's apple." It is composed of nine pieces of cartilage, a substance

somewhat similar to bone but elastic and soft enough to be cut with a knife readily. These cartilages are held together with ligaments and are covered partly with muscles which by their contraction and relaxation enlarge and diminish the size of the air passage, and modify its form. In the interior of this box are two fibrous bands, the so-called *vocal cords*, which stretch across the passage from front to rear, and divide it into two cavities. The space between these bands is called the glottis, and varies in size and form with the tension of the cords. There are two folds of mucous membrane higher up called false vocal cords, because they narrow the passage here and resemble the true vocal cords.

These bands are made more or less tense by the action of the muscles of the larynx, and it is the vibrations of these strings, together with the vibrations of the current of air forced through the larynx as through a pipe, that make the sounds of the voice. The varying degrees of pitch and intensity are produced by the tension of the cords and the form of the cavity of the larynx. From this description it will readily be seen that it is a combination of a wind and a stringed musical instrument.

To have some idea of the extreme delicacy of this organ, one must know that the ligaments which unite its parts do not vary in length more than $\frac{1}{16}$ of an inch in producing all the notes of the voice, and that a good singer is capable of sounding at least 120 distinct notes. This would give the variation required for each note only $\frac{1}{600}$ of an inch.

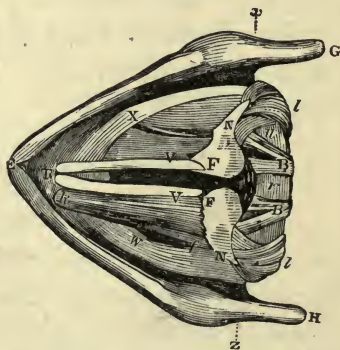


FIG. 250.—The Larynx showing Vocal Cords looking from above.

The *epiglottis* has been mentioned in connection with a description of the œsophagus. It is a sort of trap-door, formed by one of the cartilages of the larynx. It rises to admit the air, and closes when a morsel of food is passing from the pharynx.

The *diaphragm*, as we have seen (fig. 251), is an important factor in the process of respiration. It is a muscular,

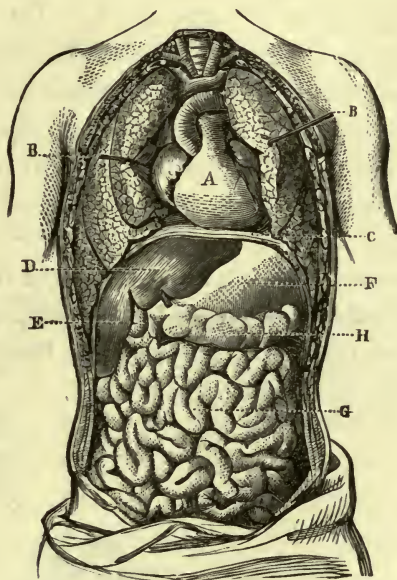


Fig. 251.—Transverse section of the thoracic and abdominal cavities.

- | | |
|---------------------------------------|----------------------|
| A. Heart | E. Gall-bladder. |
| B. Lungs separated to show the heart. | F. Stomach. |
| C. Diaphragm. | G. Small intestine. |
| D. Liver. | H. Transverse colon. |

membranous partition, which divides the interior of the trunk into two cavities. The upper cavity contains the lungs and heart, and is called the thorax; the lower, called the abdomen, contains the stomach, liver, intestines, etc. It is pierced by the œsophagus, and the large blood-vessels, and is vigorously exercised in hearty laughing, and contracts spasmodically in hiccough or "hickup."

The lungs, windpipe, larynx, diaphragm, ribs and muscles of the chest and abdomen are all necessary for the production of sound, as well as for respiration. The air is taken into the lungs, and by a forcible ejection, together with a particular arrangement of the larynx, simple sounds are produced. Articulate sounds and the various qualities of voice are produced by the tongue, lips, teeth, nostrils and palate, aided by the form of the mouth and cavities in the bones of the head. These cavities act somewhat like the box of the violin, or the sounding-board of a piano, varying in resonance, and consequently, the quality of the voice. The tongue does not seem to be absolutely essential to articulation, as cases are recorded where persons were able to articulate after the tongue had been removed.

The lungs and respiratory and vocal organs generally are extremely liable to disease, being delicately constructed organs, and exposed so frequently to impure air, and air of such varying temperature.



CHAPTER VII.

THE SKIN AND ITS APPENDAGES.

The skeleton, the type of death, is unsightly, yet the human body is none the less so when the bones are completely covered with the muscles. The latter give form and roundness to the outline, but an additional covering is necessary, not only to protect them, but to hide their unsightliness. This covering is the skin. It is made up of *two layers*; the inner or deeper is called the *derma*, or true skin, and the outer is called the cuticle, *epidermis*, or scarf-skin. The true skin is tough and elastic, consist-

ing of a network of fibers intermingled with minute blood-vessels, lymphatics, and nerves, together with certain glands. It is sometimes described as consisting of two layers, the corium or deep layer, and the papillary or



FIG. 253.—Cutaneous Papillæ.

superficial layer. The latter is so called from the numerous little elevations called *papillæ*. These elevations are very numerous in the skin of the ends of the fingers and palms of the hands. They contain the terminations of the sensitive nerves. On the inner side of the hands they are arranged in parallel curved lines, giving the surface the appearance of a file.

The epidermis varies much in thickness. In most parts of the body it is very thin and almost transparent, but in parts where pressure is frequent it becomes very

thick, as in the palms of the hands and soles of the feet. It is not sensitive, and lies so closely upon the true skin, falling into the depressions and lying over the elevations, that the form of the surface of the true skin is maintained. The various colors of the skin in different races and persons, of the same race, and the spots called freckles, are due to a certain coloring matter deposited in the cells of

the epidermis. Its use is to protect the true skin from injury, and to prevent evaporation. It is constantly being thrown off in the form of little scales, which are replaced by new growth. A blister is simply an elevation of the epidermis, caused by the effusion of the watery portion or serum of the blood collecting between this and the true skin.

Immediately beneath the skin is a layer of cellular tissue, which in most persons contains a considerable quantity of fat, and

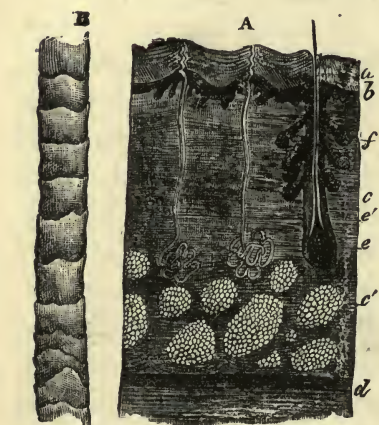


Fig. 254—The Skin.

- A. Section of skin under the microscope.
- a b. Superficial and deep layers of epidermis.
- c. Dermis—true skin.
- c'. Fatty areas of the deeper portions of the dermis.
- d. Muscular layer subjacent to the skin.
- e e'. Sweat glands and ducts.
- f. Hair-follicle and sebaceous gland.
- B. Hair seen under the microscope.

in some a very large quantity. Where fat is absent the skin seems to lie immediately upon the muscles, so delicate is the sub-cutaneous tissue, but the deposit of fat within its meshes thickens sometimes to the extent of an inch or more.

The appendages of the skin are the *glands, hair* and *nails*. The glands are of two kinds, one secreting an oily substance called sebaceous glands, the other secreting the sweat, and called sudoriferous glands. The oil glands are

more numerous about the face and scalp. The oil they exude keeps the skin and hair in a pliable condition. An absence of this secretion is a cause of chapped hands and lips. In a healthy condition the quantity of oil thrown out is sufficient to keep the hair plentifully oiled, and to make a grease spot when the fingers are rubbed on white paper. The sweat glands are found in nearly all parts of the skin, and together with the oil glands, are distributed both in the skin and in the tissue beneath it. They have ducts or minute tubes which coil in a spiral manner, as shown in fig. 254, and terminate on the surface in openings called pores. There have been counted in the palm of the hand as many as 3,528 pores to the square inch, and it is estimated that there are as many as *seven millions* in the entire body. Estimating the length of the sweat tubes at a quarter of an inch, there would be nearly 28 miles of tubing in the body.

SECRETIONS OF THE SKIN.

These little tubes are constantly pouring out water usually in the form of vapor, known as *insensible perspiration*. When there is great heat in vigorous exercise, the water appears in a liquid form and constitutes the *sensible perspiration*, or what we call sweating. The perspiration is mostly water, yet with the vast amount of it is thrown off a great deal of the waste material of the body. The act of sensible perspiration cools the body, because the heat of the body is used in evaporating the fluid. This explains why a cup of hot tea in a warm day will cool the body. It increases the action of the perspiratory glands, and the evaporation of the fluid cools the surface.

The oil upon the skin catches dust and dirt of various kinds, and to this the solid material of the perspiration also clings. If this dirt is not removed, it is liable to be ab-

sorbed by the lymphatics and taken into the blood. Soap is efficient as a cleansing agent, because it unites with the oily matter and renders it soluble in water.

THE HAIR.

There does not seem to be any resemblance in the hair to the skin, yet an analysis and close examination of its substance shows it to be almost the same in composition as the epidermis. The root of a hair consists of a bulb-like enlargement which is lodged in a sac called a hair follicle. (See fig. 254.) Most of these follicles extend beneath the true skin. When a hair is pulled out the root is not destroyed, and it grows again. The shaft, or main body of the hair is never perfectly cylindrical, but more or less flattened and varies from $\frac{1}{140}$ to $\frac{1}{2000}$ of an inch in thickness, being usually thickest in the middle of its length. The number of hairs seems to vary with the color and the part of the body. In a certain instance there were found to be 182 blonde, 162 brown, and 147 black hairs respectively on given surfaces of equal size. There were 293 hairs on a surface $\frac{1}{4}$ of an inch square on the scalp, and there were only 39 on the same amount of surface on the chin.

The color of the hair is due to a certain pigment which is deposited in its cells. When this pigment disappears the hair becomes gray. There are instances when under influence of grief or fright the hair has turned gray in a single night. This is not easily explained.

A hair grows from the root and is pushed out by additions from below. The direction is hardly ever perpendicular to the surface, but generally inclined downward. There are some cases of extremely long hair, especially on the heads of women. One instance is given of hair measuring 6 feet and 2 inches in length.

In structure a hair consists of a fibrous portion, a marrow in the center and an external layer of scales, which overlap each other like the shingles on a roof. This explains why a hair when rolled between the fingers, will always move in one direction. Hair is very durable. That found on Egyptian mummies has remained unchanged. It contains a considerable quantity of sulphur, and this with the nitrogen produces the disagreeable smell when burned. It is very elastic, and may be stretched nearly one-third of its length without breaking. A hair of the head, it is said, will support a weight of six ounces. It is easily excited by electricity and absorbs moisture readily. It is lengthened considerably by the absorption of moisture. A Swiss scientific man constructed an instrument in which he used a human hair for measuring the amount of moisture in the atmosphere. The elongation and contraction of the hair, according as the atmosphere was moist or dry, moved a delicate index.

The *nails* are also modifications of the epidermis. The horns, hoofs, claws, scales and feathers of the lower animals are of the same nature. Each nail consists of three parts, the root covered by the skin, the body exposed above but attached closely to the skin below, and a free margin or edge. The bed of the nail, or the skin beneath it, is full of blood-vessels which supply it with nourishment. The color shows through the nail, which is partially transparent. That part near the root is not so well supplied with blood-vessels and appears as a white space called the lunula, from its resemblance to the moon. The nails grow from the root and bed and are pushed out as new growths take place from beneath. The finger nails grow at the rate of about $\frac{1}{30}$ of an inch in a week, while the toe nails grow only about $\frac{1}{120}$ of an inch a week. When a nail has been torn off, a new one grows again if the bed of the nail has

not been greatly injured. The parts beneath the nail are exceedingly sensitive, a fact which, perhaps, most persons are aware of, having at some time in their lives had their thumbs or fingers pinched or pounded. The painful affliction known as an ingrowing toe nail is another illustration of this fact. In truth, the nail does not grow into the flesh, but the latter is pressed against the edge of the nail by wearing tight shoes until it becomes inflamed and sensitive. In such cases it often becomes necessary for the surgeon to remove the nail entire by drawing it out with a proper instrument, a very painful operation.



CHAPTER VIII.

THE NERVOUS SYSTEM.

Says Draper, "It may be truly said that the position of any animal in the scale of existence is directly dependent on the degree of development of its nervous system."

The plant has no nervous system that has been discovered, and the lowest animals have scarcely a distinguishable trace. The possession of a nervous system has been taken as one of the differences between plants and animals, yet some plants, as the sensitive plant and some others, exhibit a sensitiveness to external forces equal to that which characterizes many animals not very low in the scale.

We have seen that the use of the bones was to form a framework for the body, to act as levers for motion, and to protect delicate parts; that the muscles were endowed with the power of contraction, and could move the parts of the body; that the digestive organs secreted certain fluids which acted as solvents and modifiers of the material from which the body is built and renewed; that the circulating and lymphatic systems were the means of conveying material from one part of the system to another; that the respiratory organs were for the removal of waste and the accession of oxygen; that the skin and its appendages were for the protection of other parts, and to aid the respiratory system in removing waste. Now we are led to inquire what is the office of the *nervous system*, which serves no purpose similar to any of these.

The nervous system does not perform any special act of itself, but seems to act in some unexplained manner upon the organs, exciting them to the performance of their respective duties.

When a muscle contracts, there is something that stimulates it to contract. It does not act spontaneously, that is, of itself, without being acted upon by some other force. When a gland performs its work it is controlled by a force outside of itself. The blood would not circulate to any considerable extent, did not the heart beat, but the heart would not beat if it were not acted upon by a force. What is, then, this force, which stimulates and regulates the actions of the system? We call it nerve force, and it resides in a peculiar kind of matter, called nervous matter, distributed throughout the body in a manner to be hereafter described.

PARTS OF THE NERVOUS SYSTEM.

For convenience of description, the nervous system may be considered as consisting of the brain, the spinal cord, the ganglia, and the nerves. The brain is the large mass of nervous matter occupying the entire cavity of the skull. It weighs, on an average, in the adult male, $49\frac{1}{2}$ ounces, in the female, 44 ounces. The brain of Cuvier, the great French naturalist, weighed 64 ounces. The brain of an idiot seldom weighs over 23



FIG. 256.—Cerebro-Spinal Nervous System.

ounces. It is composed of four portions, the *cerebrum*, the *cerebellum*, the *pons varolii* and the *medulla oblongata*.

The *cerebrum* is much the largest portion, and is divided into two hemispheres by a fissure extending from before backward, reaching to the base in front and behind, but only part way down in the middle, the halves being there connected by a body of white matter (*corpus callosum*). The outer surface is thrown into deep folds, or

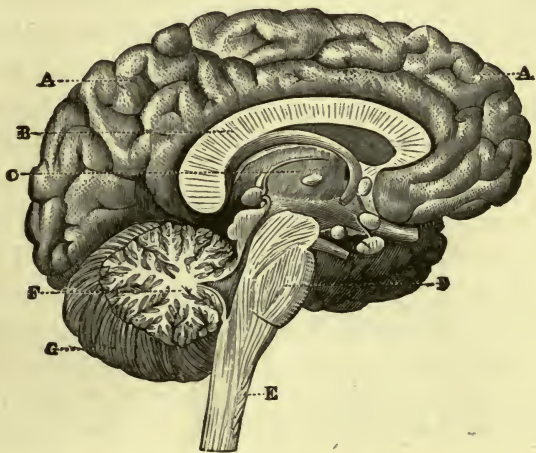


Fig. 257—Section of the encephalon in the median line.

- | | |
|---|---|
| A. Plane of the great fissure. | E. Spinal cord continued from the medulla oblongata. |
| B. Corpus callosum. | F. Section of cerebellum, showing the "tree of life." |
| C. Optic bed. | G. Left hemisphere of the cerebellum. |
| D. Pons Varolii, under which is seen the medulla oblongata. | |

convolutions, which are more numerous and deeper in men of great intellectual power. They seem to be for the purpose of increasing the amount of surface.

The *cerebellum* (little brain) lies in the back and lower part of the skull, beneath the back part of the cerebrum. It is about one-eighth as large as the latter. It is also divided into two hemispheres by deep notches. Instead of convolutions, its surface is made up of plates which lie very close together. The *pons varolii*, or middle brain

(fig. 257), is a kind of bridge of nervous matter which connects all the other parts of the brain together. The term means "the bridge of Varolius," and was so named from Varolius, an Italian, who first described it.

The *medulla oblongata* ("oblong marrow"), is really the upper enlarged part of the spinal cord, or the connecting link between the brain and the spinal cord.

The brain has *three coats* or coverings; the outer one (*dura mater*) is tough and strong, lying close to the inside of the skull, and dips down into the fissure between the hemispheres, and between the cerebrum and cerebellum. The second membrane is very delicate, and is in the form of a shut sac, the space between containing a small quantity of a watery fluid. The third and inner covering is made up mostly of minute blood-vessels, which are for the nourishment of the substance of the brain. These membranes, together with the hard plates which form the cranium, it will be seen, form a very effectual protection to the soft and yielding mass of matter within.

WHITE AND GRAY MATTER OF THE BRAIN.

If a brain be cut across about the center, there will be seen two large masses of *white* matter, forming the larger part of each hemisphere, connected by a sort of bridge, also of white matter. Surrounding these masses of white matter is a border of *gray* substance, about one-fourth of an inch in thickness. This gray border follows the folds or convolutions seen on the surface, and consequently dips in toward the center in many places. Now if a section be made a little lower down, there will be seen in the center, between the two hemispheres, two rather large cavities which are lined with a serous membrane. (The largest is seen beneath the corpus callosum, fig. 257.) They contain a small quantity of fluid. If the cerebellum,

or little brain, be cut across, the arrangement of gray and white matter presents the appearance of the leaves and branches of a tree. (F. fig. 257.)

The *spinal cord* is a long cylinder of nervous matter contained in the spinal canal, extending from the brain to the lower part of the spinal column. It gives off branches, which proceed in pairs from openings in the bones. These branches are the spinal nerves. Like the brain it has gray and white matter, but the arrangement of the matter is different. The white matter is on the outside, and the gray in the center, in two crescent-shaped masses. The spinal cord, in common language, is sometimes called the marrow

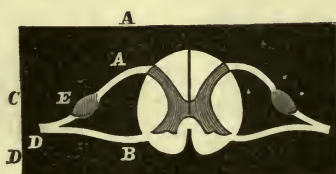


FIG. 25S.—Diagram of a Cross Section of the Spinal Cord.

- | | |
|------------------------------------|--|
| A. Posterior root of spinal nerve. | E. Ganglion. |
| B. Anterior root. | D. Spinal nerve, the dark portions in the center show the gray matter. |

of the back bone, but it is in no sense like the marrow of bones. The spinal cord is covered with a continuation of the membranes which invest the brain.

The nerves are round cords of white matter which proceed from the spinal cord and brain like the branches of a tree. Besides those given off from the brain and spinal cord, there is the *sympathetic* nerve which lies on the inside of the trunk in front of the spinal column, and consists of a vast network of nervous cords distributed to the internal organs, and connected in many places with the spinal nerves and those from the brain. It has also numerous ganglia or knots of gray matter in its course. These ganglia are also found in the spinal nerves and in those

coming from the brain, or cranial nerves. The sympathetic nerve is so called because it is thought that by means of it one organ or set of organs has an influence upon or sympathy for other organs.

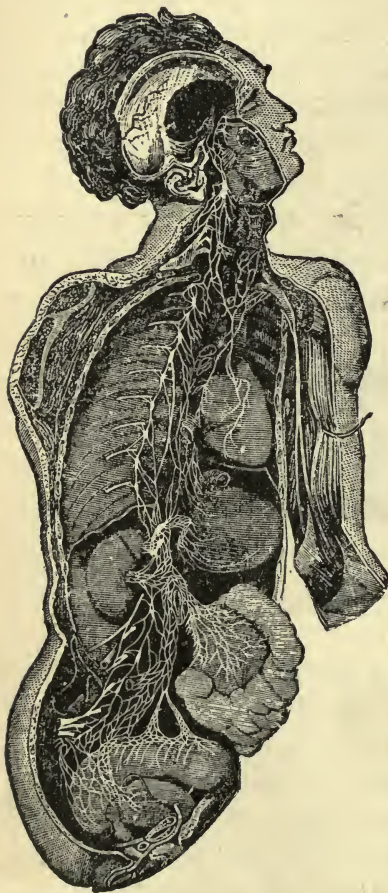


FIG. 259.—The Sympathetic System.

The cranial nerves are arranged according to some anatomists in nine pairs and according to others in twelve pairs which are named numerically from the order in which they pass out of the skull from before backward. They are also named from their uses and the parts to which they are distributed.

To understand what is meant by pairs, it must be remembered that the body is made up of two symmetrical halves, and that nearly every organ of the body is double. Thus we have two eyes, two ears, two halves of the brain, etc. There are then, two sets of nerves which proceed to the two halves of the body. The spinal nerves, or those coming from the spinal cord are arranged in thirty-one.

pairs and distributed to the trunk and limbs.

SENSORY AND MOTOR NERVES.

Nerves, like blood-vessels, begin in large trunks and divide and subdivide until they reach with their small

branches every part of the body. The spinal nerves have each two roots, or origins in the spinal cord. If the *posterior* root of any one be cut, the part to which that nerve is distributed will lose all sensation. If the *anterior* root be severed, the part to which the nerve is distributed loses the power of motion, but not of sensation. This leads us to conclude that the different parts of these nerves have different offices to perform.

When the finger is pricked or burned we involuntarily withdraw it from the source of irritation. We conclude that in some mysterious manner there is an impression conveyed along a part of the spinal nerve to the cord and then another impression is conveyed back along the other part to the finger, and causes the muscles to contract and the limb is withdrawn. Therefore we call the posterior of these roots the *sensory* roots, or that part of the nerve, the sensory nerve and the anterior roots, the *motor* roots, and that part of the nerve, the motor nerve.

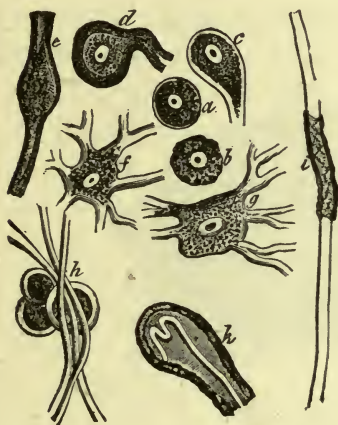


Fig. 260.-Nervous tissue seen under the microscope.

a b, Spherical nerve-cells.

c, Bi-polar cell.

f g, Multi-polar cells.

h, Cells of the ganglia and nerve-fibres.

i, Nerve-tube and axis-cylinder.

k, Termination of a nerve-fibre in an organ.

the motor nerve.

We have seen that nervous matter is of two kinds, gray and white. The gray matter consists of a great number of cells which contain a coloring matter and are embedded in a granular material which is mingled with white fibers. The gray matter is found in the outer surface of the brain, the inner part of the spinal cord, and in the ganglia. It seems to be the originator of nerve force, hence the parts

containing gray matter are called *nerve centers*. The brain is the great center containing the greater part of the gray matter and the spinal cord may be considered as the continuation of the brain and the ganglia as so many little brains. In the lowest animals which have a backbone, as the fishes, the brain is very small comparatively, and may be considered as merely an expansion of the spinal cord.

NERVOUS TISSUE.

The white matter of the nervous system consists of bundles of fibers, each bundle surrounded by a sheath.

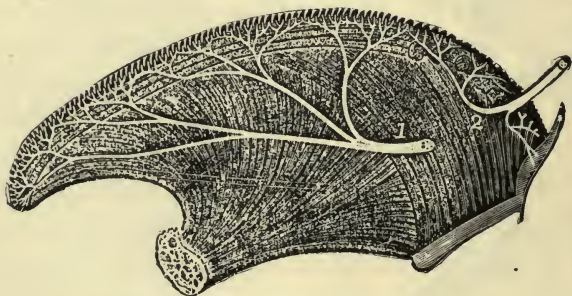


FIG. 261.—The Tongue and Nerves of Taste.

The individual fiber when examined with the microscope after death is seen to consist of a sheath inclosing a white substance, in the center of which lies a very fine, gray, thread-like cylinder. (See *i* fig. 260.) The white or fibrous nervous matter is thought to be the means of conveying nerve force from the centers to the various parts and organs, and from the organs to the centers. These nerve fibers terminate generally by the formation of delicate networks. There are, however, particular modes of termination of certain nerves. Thus the nerves of sensation which are distributed to certain parts of the skin, as in the tips of the fingers, terminate in rounded bodies called "tactile corpuscles" (see *k* fig. 260) and are thought to be the special

organs of the sense of touch ; the motor nerves terminate in the muscles as minute plates ; some of the nerves going to the tongue end in bodies called "taste buds," or "taste bulbs"; those to the lining membrane of the nose in "olfactory cells"; the nerve to the ear in what are called "auditory hairs"; the nerve to the eye in bodies called "rods and cones of Jacob."

The gray matter is largely cellular in structure ; when seen under the microscope, some of these cells are spherical, others have one pole or projection called *unipolar*, others several, and called *multipolar*. (See fig 260.)

The nervous system then, may be compared to a vast network of telegraph wires and batteries. The gray cells of the brain, spinal cord and ganglia act as so many batteries which generate nerve force, and the white fibrous matter of the brain and cord and the nerves act as so many wires which distribute the force to every part of the complicated machine which we call the human body. The brain is the great center which controls all and furnishes the greater part of the nerve power. The smaller centers, while they may originate power in a degree, depend upon the brain for a renewal of their force. This is illustrated in the case of the turtle with its heart taken out of the body. The heart will continue to beat for several hours after it has been removed from the body, and all the blood washed out of it. In the substance of the heart are found a number of ganglia. These furnish the stimulus which causes the heart to continue beating, but they are in connection with the brain of the animal, and receive new supplies of force from that organ

The nervous and the merely physical functions react mutually on each other. A vigorous nervous system gives a vigorous muscular system. Proper care of the muscular and digestive systems reacts favorably on the nerves.

REFLEX ACTION.

There are many interesting facts connected with the action of the nervous system, some of which I will now notice. There are certain acts of the body that take place without the exercise of the will. If a person be tickled in the face while he is sleeping, he will move his limbs, though he is perfectly unconscious. When a motion is made toward the face, the person involuntarily winks. The hand is quickly and involuntarily withdrawn when it accidentally touches a hot stove. These actions are called *reflex*. Reflex action may be defined as the conveyance of an impression from the extremity of a nerve to a nerve center and from thence to an extremity again. The impression is conveyed *to* the center by sensory nerve fibers, hence these are called *afferent* ("bearing to") nerves, and the impression *from* the center is conveyed by motor nerve fibers, hence they are called *efferent* ("bearing out") nerves.

Nearly all the movements of the parts of the body are the result of this reflex action. For example, the sight and odor of food excites the salivary glands to action, as well as the presence of food in the mouth. An impression is conveyed through the nerves of sight, of smell, of taste, or of common sensation, to the brain and back again through the motor nerves to the glands. In the same manner the stomach secretes gastric juice from the reflex action caused by the presence of the food. Coughing, sneezing, sighing, yawning, hiccough, spasms or convulsions and other involuntary acts are the result of reflex action caused by some irritation to the extremities of the nerves. In fact, all sensations of feelings are the result of an irritation thus reflected, though we cannot always tell just where the irritation originates. Thus we have

the sensation of fatigue, of restlessness or uncomfortable-ness, and we cannot locate the effect, but evidently it is the result of an irritation produced by some condition of the blood.

These reflex actions are independent of the will of the individual but take place, as we sometimes say, *automatically*, or mechanically. Thus far man is merely a machine, which acts only as it is acted upon by some stimulus. It is, however, a wise arrangement. Were the acts of the body, such as circulation, respiration, digestion, etc., controlled by the will, we might forget sometimes to breathe, or we might allow the heart to stop, and death would result. But the will has an influence over these actions to a certain extent. We can hold our breath for a time and by strong effort can resist to some extent certain ordinarily involuntary movements.

Certain habitual voluntary acts may, by long practice, become involuntary or mechanical. Thus when reading we use voluntary muscular effort to hold the book but we become so accustomed to it that we may hold it without being conscious of the fact, our whole attention being directed to the subject matter. An amusing story is told in Huxley and Youman's *Physiology*, of a wag who, seeing a discharged soldier carrying his dinner, called out suddenly "Attention!" whereat the veteran dropped his dinner and brought his hands to his side as he had been accustomed to doing under command of the officer.

FUNCTIONS OF THE DIFFERENT PARTS OF THE BRAIN.

In order to determine the functions of the various parts of the brain and nervous system, some very interesting experiments have been performed upon the lower animals. If the cerebellum, or little brain of a pigeon be removed without injuring the other parts, the bird loses all control

over its movements. It staggers, reels, and though it can move its wings and legs rapidly enough, cannot walk nor fly. Its senses and intelligence remain the same. This experiment seems to prove that the cerebellum controls the movements of the body.

Now if in another pigeon the cerebrum be removed, without injuring the cerebellum, its conduct is quite different. It remains standing on its feet perfectly quiet for an indefinite time, and when aroused moves sluggishly. It seems to have no consciousness of what is going on. Placed on its back it will get on its feet and if thrown in the air, will fly for quite a distance. It may be induced to move by sudden sharp sounds, and by flashes of light. If food be placed in its mouth it will swallow, and digestion will go on and the bird may be kept alive for some time. This experiment seems to prove that the cerebrum is the seat of consciousness, will, judgment, and intelligence. The animal deprived of its cerebrum seems to act only when stimulated, and to perform only those habitual acts which may take place without consciousness, and independent of the will.

If a frog be deprived of its cerebrum it will remain sitting in a natural position on the table, but if turned over will immediately resume its former position. If thrown into water it will swim and continue to do so until exhausted, unless it comes against something on which it can rest, when it will climb upon it and remain motionless until disturbed by some other external cause. A curious experiment may be performed with it. If placed on a board it will remain quiet so long as the board is held level, but if the board be turned to one side, the frog will climb to the upper part to keep itself from falling and by slowly turning the board it may be made to creep round and round, always keeping on the upper side. None of its actions

are spontaneous. It acts in all respects like a machine.

Such experiments could not be made successfully with man, as the shock to the delicate nervous system would produce death too quickly after the operation. But these experiments prove that the cerebrum is the seat of voluntary action. It is where the internal stimulus to action originates. It has not been shown, however, that any particular part of the cerebrum is the seat of any particular mental faculty.

CROSSING OF NERVES IN THE MEDULLA.

An injury to one side of the brain may cause loss of motion on the opposite side of the body. This is explained by the fact that the motor nerves where traced up the spinal cord cross to opposite sides in the medulla oblongata. The sensory nerves cross each other throughout the entire length of the cord. Hence an injury to one side of the cord will produce loss of sensation on the opposite side below the point of injury.

There is a point in the medulla oblongata which, if injured, death immediately results. This point was called by Flourens the *vital knot*, or ganglia of life. Death results because the nerves which control respiration have their origin at this point. For this reason it is also called the respiratory center. The Spaniards have a method of executing criminals, called garroting, which consists simply in driving a sharp-pointed instrument between the skull and first bone of the spinal column and penetrating to this part. The brain of an animal may be cut away down to the medulla and nearly all of the spinal cord without producing immediate death. The diaphragm, however, is controlled by the phrenic nerve which arises from the spinal cord, and when this is severed respiration becomes much labored because the action of the diaphragm ceases.

CHAPTER IV.

ORGANS OF SPECIAL SENSE.

The parts known as the organs of special sense are the *eye*, the *ear*, the sensitive *papillæ* of the skin, the *tongue*, and the lining *membrane of the nose*. Certain nerves which go to these parts are endowed with peculiar properties. If the skin, or surface of the body be pricked anywhere or exposed to great heat or cold, we experience a sensation which, we usually call pain. This may be called common or general sensation, but when the light falls upon the nerve which goes to the eye we experience no pain but a peculiar sensation, or rather, we are conscious of something which we call light. Likewise vibrations of the tympanum made by certain bodies, cause a sensation which, without the special nerves in the ear, we would not perceive, and we call this sensation, sound. The nerve in the nose does not perceive sound nor light, but a sensation we call smell. The nerves of the tongue make us conscious of another sensation, and we call it taste. When we place our hand on a ball though we do not see it we know it is round, and on a piece of velvet, that it is soft. This sensation we call touch or feeling. These then, are peculiar sensations, each conveyed to the brain or seat of consciousness by a special nerve, and they are called special sensations. They are commonly known as "*the five senses*," or "*the senses*." The organs which contain these nerves of special sense may be considered as aids to the

nervous system, or as inlets to the mind, for we cannot acquire knowledge, or in other words, the mind cannot put itself in relation with the external world without these organs.

THE EYE.

The eye is one of the most important of the organs of special sense. It has been called "the window of the soul," and the figure is a striking one, for it is one of the principal means by which the soul or mind communicates with the external world. If a room be closed tightly so as to exclude all the light and then a small opening be made in a window-blind, the objects in front of the opening will be accurately pictured on the white surface of the opposite wall, except that they will be reversed. The reason of this is, that the light reflected from the top of the object falls upon the bottom of the wall, or screen, and the light from the bottom falls at the top, and so also the rays of light cross from the sides, and all parts of the object and the picture is completely reversed. A box so arranged with a lens to converge the rays of light and throw the picture on a slide is called a *camera obscura* (*dark room*.) It is used by photographers. A simple experiment illustrating this fact may be performed with a common spectacle glass. Hold the glass between a lighted lamp and the wall or a screen of white paper, and by properly adjusting the distance of the glass from the lamp and screen an inverted image of the lamp will be seen upon the screen. Now a spectacle glass is a simple convex lens, or a piece of glass which is thicker in the middle than at the edges. If a lens which is more convex, such as a common pocket magnifying glass, or sun glass be used, in order to produce the image distinctly the lens will have to be moved nearer the screen. The point of light which forms the distinct image is called the focus. The more

convex the lens the nearer the focus will be to the lens, and the less convex the farther away.

The human eye is just such an instrument as the camera obscura, and pictures of all objects which we see are thrown reversed, on the back part of a globular chamber.* The eye, however, has the advantage over an instrument made by man; it has the power of adjusting itself to accommodate the distances of objects. This is done by the lens being elastic and certain muscles so arranged as to pull upon its circumference, thus rendering it less convex and lengthening the focal distance, which is again shortened by the relaxation, or letting go, of the muscles.

This then, is the simple philosophical principle of the eye. Let us examine more closely and see how this wonderful though simple instrument is constructed. What is known as the eyeball is in the form of a sphere which has a small portion cut off, and a portion of a smaller sphere fastened upon it. The eyeball is composed of several coats closely adherent to each other and inclosing certain transparent substances. The first or outer coat (*sclerotic*) is hard, dense and tough, and composed of two parts. The main portion, or that forming the larger sphere, is of

*It has been questioned whether the image formed on the retina would not remain long enough to be seen by another person, after the death of the individual. In other words, if we were to examine the retina of the eye of a dead man could we see the image of the objects last beheld by him. If this were possible murders might often be detected, for the dead man would have a picture on his retina of the one who committed the deed. Numerous experiments have been made upon animals to ascertain definite knowledge on this subject, but thus far with but rather negative results.

Dr. Ayers kept a rabbit in the dark an hour, then exposed him to the bright daylight in a box covered with a plate of glass on which was painted a number of black stripes. The animal was then taken into a dark room, killed, the eye extracted, the retina exposed and examined. A plain picture of the stripes on the glass was seen upon the retina. He next tried to produce the picture of a man in a similar manner, but the result was unsatisfactory, only a faint image of his shirt collar, and nose was visible; not enough to recognize the picture.

Dr. Ayers concludes the account of his experiments by saying, "It is utterly idle to look for the picture of a man's face, or of the surroundings, on the retina of a person who has met with a sudden death, even under the most favorable circumstances."

a white color, and is known as the "white of the eye." The smaller portion, called the *cornea*, is that which forms the part of the lesser sphere, is transparent, and shows the color of the parts behind it. It is of nearly the same constitution as the white portion of the outer coat and is continuous with it, although it seems to fit into it like the crystal in a watch.

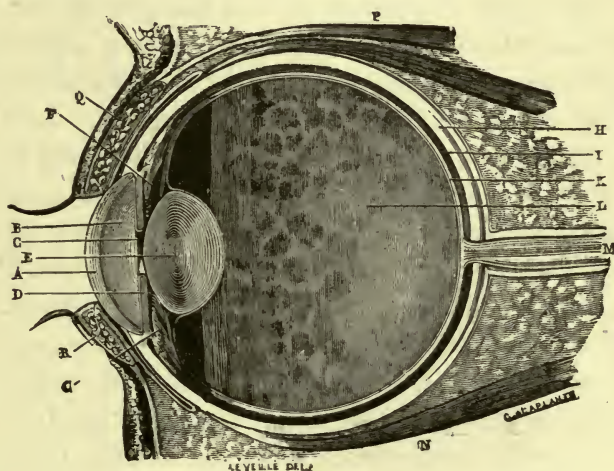


Fig. 262—Vertical section of the eye on the media line.

- | | |
|---|------------------------------|
| A. Cornea. | I. Choroid. |
| B. Anterior chamber. | K. Retina. |
| C. Pupil. | L. Vitreous body. |
| D. Iris. | M. Optic nerve. |
| E. Crystalline. | N. Right inferior muscle. |
| F. Zone of Zinn, forming the anterior wall of canal of Petit. | O. Right superior muscle. |
| G. Ciliary processes and circle. | P. Levator muscle of eyelid. |
| H. Sclerotic. | Q. Lachrymal glands. |
| | R. Lachrymal canal. |

The second coat of the eye (*choroid*) lines the first. It is thin, contains many blood-vessels, and is of a dark color. It lines all of the first coat except the cornea in front. A little behind the cornea which bulges out and forms the part of the smaller sphere, is stretched a circular curtain with a circular opening in its center. This curtain is called the *iris*, from a word meaning the rainbow, because of its various colors. It is what gives color to the

eye, in some persons being blue, in others, black, etc. The opening in the center is called the *pupil*. The iris is composed of muscular fibers arranged in two sets. One set is arranged in a circular manner, so that when they contract the pupil is lessened, the action being somewhat like a purse with a draw string. The other set radiate from the center like spokes of a wheel, and when they contract the diameter of the pupil is increased. These muscular fibers contract from the stimulus of light. When the light is very bright the contraction of the circular fibers is so great as to make the pupil very small, but when the light is diminished these fibers relax and allow the radiating fibers to enlarge the pupil to a great extent. This changing of the size of the pupil is done very rapidly. If you stand before a mirror in a good light you will observe that the pupil is very small. Now if you throw a shadow on the eye by the hand or some object, you will observe the pupil suddenly grow larger. The eyes of animals which seek their prey after night have extremely dilatable pupils. This may be noticed in the owl by bringing one into the direct sunlight. The pupil will contract to the size of a pin-head. If the creature be taken into a dimly lighted room, the pupil will enlarge to the extent of half an inch. Certain medicines cause contraction of the pupil, and certain others cause dilation. The pupil is dilated in certain forms of brain disease, and in some other forms it is contracted.

The third coat, called the *retina* of the eye, is merely an expansion of the optic nerve. It lines the second coat and is composed of three layers; the outer is called Jacob's membrane and is composed of columnar or rod-like bodies intermingled with cone-like bodies. These are known sometimes as the "rods and cones of Jacob," and are considered as the terminations of the optic nerve and the organs which distribute the nerve force for the reception

of the impression made by the light. The middle layer is granular in nature, and the internal is thin, semi-transparent, and composed of nerve cells and fibers. The optic nerve does not enter the eye in the center of the back part, but a little to one side. At this point there is a little projection and the part is destitute of nerve elements. It is consequently called the blind spot. The fact that there is a blind spot may be proven by a simple experiment. Closing the right eye, look steadily with the left at the letter B with the book at the distance of about twelve inches.

A

B

Both letters A and B will be seen quite plainly. Move the book slowly toward the eye, keeping it steadily fixed upon the letter B; when a certain distance is reached the letter A will disappear, but as the book comes nearer the eye, it again appears. The explanation is this: In the first position of the book the light from the letter falls upon a part of the retina containing nerve elements, but when the book is brought nearer the eye, the angle being changed, it falls upon this point where the optic nerve enters, and there being no nerve elements here, there is no perception of the image, hence no vision. As it is moved nearer the eye the image falls on the other side of this blind spot, and is perceived. In the center of the retina is a yellow spot. This is the point where vision is the most distinct. The fact that the "rods and cones" are more abundant here, and that there are none at all in the blind spot, while there are nerve fibers in all parts of the retina, seems to prove that these rods and cones are the real organs concerned in seeing.

HUMORS OF THE EYE.

The *humors* of the eye, or those parts which are transparent and concerned in converging the rays of light on

the retina, consist of the *crystalline lens*, the *aqueous humor*, and the *vitreous humor*. The crystalline lens is a transparent, semi-solid body, circular in form but much thicker in the center than at the edges. It is inclosed in a thin, transparent membrane called the capsule, which is attached to the coats of the eye. The lens and its capsule lie behind the iris and divide the cavity of the eyeball into two unequal parts. The space in front of the lens is filled with a thin, colorless fluid called the aqueous humor. In this space the iris hangs like a circular curtain with an opening (the pupil) in its center, the aqueous humor bathing it on both sides. The space back of the crystalline lens is filled with a transparent fluid which is of the consistence of thin jelly and called the vitreous (glassy) humor. If the aqueous humor be let out by a wound, it may be again restored, but this is not the case with the other parts of the eye.

All the transparent parts of the eye act together as a lens to converge the rays of light upon the retina. If the eyeball be too much rounded, the rays are brought to a focus before they reach the retina, and the person is then short sighted, or near sighted. If the eyeball be too much flattened the rays are not brought to a focus soon enough, and the person is far sighted, or long sighted. The former condition prevails among young persons, and the latter among old persons. Spectacles correct these defects by furnishing artificial lenses which change the focus of the rays of light.

The eyeball is covered in front with an extremely sensitive membrane which also lines the inner side of the eyelids. Nearly all cases of "sore eyes" are inflammations of this membrane.

The eyeball is moved by certain muscles. It sometimes happens that the muscle which rolls the eye out-

ward (11 and 12 in fig. 263) is too short and the eye is permanently drawn outward, causing the condition known as "wall eyed." If the inner muscle (10 in fig. 263) is too short, we have the condition of "cross-eyed." The surgeon may in most cases remedy the defect by cutting with a proper instrument the shortened muscle. The opposite muscle will then draw the eye to the proper position, and the divided muscle will be lengthened by the addition of new material as it heals.

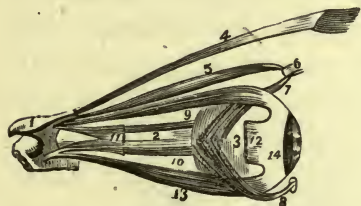


FIG. 263.—Muscles of the Eye.

The dark color of the second coat of the eye is necessary, as it absorbs the rays of light which come in from the sides and do not strike the retina, but if not absorbed would be reflected and cause a confusion of the image. In certain abnormal races of men known as albinos, this coloring matter is absent, and their sight is consequently defective.

DISEASES OF THE EYE.

The disease known as cataract is an opacity of the crystalline lens or its capsule, so that rays of light cannot reach the retina. In such cases the surgeon often removes the lens entire by cutting in at the top of the cornea and lifting it out. The other parts usually adapt themselves to the new condition, and sight is completely restored. It is generally necessary, however, to wear a certain kind of spectacles known as cataract glasses. If in such cases medicines which dilate the pupil be used, perhaps a little light will enter the eye around the lens. Quack doctors often take advantage of this fact. They give the patient the medicine, telling him his sight will be gradually re-

stored. He sees light, and is encouraged. The doctor gets his fee and departs for fresh fields and new subjects.

SECRECTIONS OF THE EYE.

Tears are secreted by a gland called the *lachrymal gland*, located in the upper and outer angle of the bony socket which contains the eye. There is a constant flow of tears which are distributed over the eyeball by the winking of the eyelids and conveyed away finally by a duct which passes through the lachrymal bone and enters the cavity of the nose. When the eyes are irritated as by smoke, or the emotions are excited, the gland pours out such an abundance of fluid that the lachrymal duct is not sufficient to carry it away and it runs over the lids on the face. This overflow of the tears we call weeping. It is evident that the rise of the tears is to keep the eyeball, clear and prevent friction of the lids. We rub our eyes on waking in the morning because the secretion of tears during sleep has not been so great and the eyelids have not been moved to distribute the fluid over the eyeball, and the gentle irritation and movement increase the secretion and distribute the fluid, thus relieving the sensation of dryness. Part of the tears are doubtless evaporated before reaching the cavity of the nose and the air passing through that cavity causes the evaporation of the remainder. The eyelashes and eyebrows protect the eye from dust and excessive light, and add much to the beauty and symmetry of the face.

THE EAR.

The *ear* is another organ by means of which the mind communicates with the external world. It is conveniently considered as consisting of three parts, the *external*, the *middle*, and the *internal*. The part which we see projecting is composed of cartilage and skin and

called the *pinna* or *auricle*. This, with the tube which leads to the middle ear, constitutes the external ear. The use of the pinna is to collect the waves of air which proceed from a sounding body and converge and direct them to the middle ear. It is somewhat in the form of a trumpet and acts much as a funnel which is used to pour liquids into a small-mouthed bottle. There are three small mus-

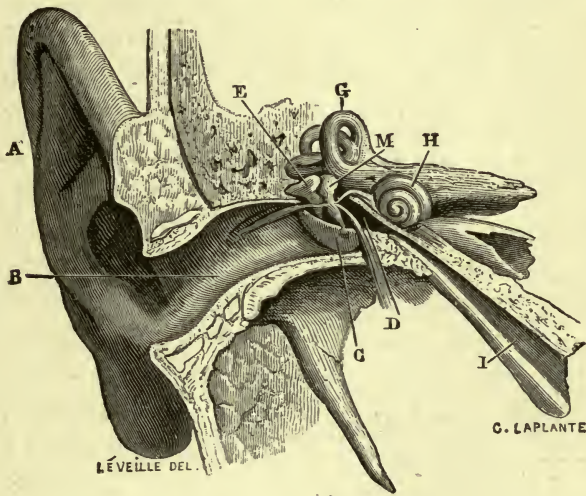


Fig. 264—Section showing the different parts of the ear.

A. *Pavilion, or projecting ear.*
 B. *External auditory canal.*
 C. *Membrana tympani.*
 D. *Tympanum.*
 E. *Incus, or anvil.*

M. *Malleus, or hammer.*
 G. *Semicircular canal.*
 H. *Cochlea, or shell.*
 I. *Eustachian tube.*

cles on the side of the head attached to each ear, but in man they rarely have any power of contraction to move the ear. Occasionally a person is found who has the ability to move the ears to some extent. But in many of the lower animals these muscles are strong and well developed and turn the ear in all directions so as to catch the sounds quickly. The rabbit is a good example of this.

The middle ear, also called the tympanum ("drum"), is an irregular-shaped cavity in the temporal bone which

forms part of the walls of the skull. It is separated from the tube leading to the outside by a membrane which stretches across like the head of a drum and communicates with the pharynx by means of a very small tube through which air may enter from the mouth. The membrane communicates with the internal ear by a chain of three very minute bones, one of which resembles in shape a *stirrup*, another a *hammer*, and the third an *anvil*, and which have received the Latin names of these articles.

The tube which communicates with the pharynx is called the Eustachian (fig. 264) tube after an anatomist who first described it. Its use is an important one, as will appear from the following facts: It is well known that the air near the surface of the earth is much more dense than that upon the summit of a high mountain, also that persons who descend in a diving bell are surrounded by an atmosphere much more dense than that at the surface of the earth. Now the tympanum must contain air to perform its proper office, and this air must communicate in some way with the external air. If it did not the effect upon the tympanum would be disastrous because when the person entered an atmosphere much rarer than ordinary the air inside would expand and perhaps burst the membrane; and on the other hand should he enter an atmosphere more dense than ordinary, the membrane would be pushed in by the greater weight of the air outside. Now if there is a free communication between the internal and external air the equality of pressure will be maintained. The Eustachian tube is opened during the act of swallowing, and a little air enters to the tympanum. If you close the nostrils and make an effort to swallow you will perceive a peculiar clicking sensation in the ears due to a quantity of air suddenly passing into the middle ear from the throat. As the air is not exchanged readily, except during swallowing,

it has been suggested that to avoid the disagreeable feeling caused by pressure on the membrane while ascending mountains, or in diving bells, one should frequently make efforts to swallow.

The internal ear is called the *labyrinth* because of its intricate windings. It is difficult to describe, but some idea may be obtained by saying that it consists of three parts, first, a cavity called the vestibule which communicates with the other cavities, and the middle ear; second, three bony channels called *semi-circular* canals; third, a cavity in the form of a snail shell, called the *cochlea*. The first two cavities contain a membranous sac, which is surrounded with a fluid, and contains a fluid. The auditory, or nerve of hearing, branches out and terminates in these cavities, being surrounded by a fluid. It proceeds from the base of the brain and enters the temporal bone at a point about opposite the external opening of the ear, but at a distance of nearly two inches, the bone having a thick portion here. The bony prominence which may be felt just back of the ear is a part of the temporal bone, and lies very close to the middle ear. It contains numerous small cavities which communicate with the tympanum, and are supposed to have something to do with modifying the sound waves.

The process of hearing, so far as it is understood, is as follows: When bodies are set in vibration in any way, as by being struck, they communicate their motion to the air surrounding them. The air thus set in motion, is in the form of waves. These waves, called sound waves, enter the ear through the channel for that purpose, being concentrated by the trumpet-like external ear, and strike the membrane of the tympanum which is set in vibration. This membrane communicates its motion to the little bones which communicate with the labyrinth. The liquid in

the labyrinth is thus set in vibration, and here the auditory nerve receives an impression and conveys it to the brain, and we realize a sensation which we call sound. This is the common way in which the auditory nerve receives impressions, but the liquid in the labyrinth may be shaken through the bones of the head. If a watch be placed on the forehead, or laid on the table while the person holds a stick in his teeth, the other end touching the watch, its ticking may be distinctly heard, the vibrations being conveyed through the bones of the head to the labyrinth. The *audiphone* depends on this principle of transmission of sound waves.

TASTE, SMELL AND TOUCH.

When soluble substances are placed on the tongue or back part of the mouth, in most cases a peculiar sensation is experienced. We call this sensation *taste*. The mucous membrane of the tongue is covered with little elevations in which the nerves of taste terminate (see fig. 261) called taste bulbs. Many of the sensations we call taste are in reality complex, being partly made up of sensations of touch and of smell. Thus we speak of tasting an onion when the greater part of the sensation is that of smell. This may be shown by holding the nose and placing odoriferous substances in the mouth. The sensation is very much diminished. Persons who have nasal catarrh which impairs the sense of smell cannot taste these odoriferous substances. If the nostrils be closed and the eyes shut, an onion can scarcely be distinguished from an apple. A substance which has a strong taste, will affect the nerves for some time, and we say that we cannot get the taste out of our mouths. If other substances be then placed in the mouth it will be difficult to distinguish any difference.

The organ of the sense of smell is the mucous mem-

brane which lines a part of the inside of the nose. The olfactory nerve which conveys the sensation of smell is distributed to this membrane. This membrane is spread over curved bones which gives it greater surface. As the air loaded with odoriferous particles passes over this membrane on its way to the lungs, the nerves are impressed with the sensation. The sense of smell in some persons is very acute. Some physicians are able to distinguish certain diseases, as small-pox, typhus and scarlet fevers, etc., by the peculiar odor. The olfactory nerve branches before it leaves the skull and descends in about twenty divisions through as many small holes in the bone.

The sense of feeling, or *touch*, is not so well defined as those of sight, hearing, taste and smell. The special sense of touch seems to reside particularly in the skin of the inside of the fingers. Thus we can distinguish the texture and form of a body by feeling with the fingers, but the nerves distributed over the surface of the body respond generally only to impressions made by heat or cold, or to such as cause pain. Pressure on any part of the body causes a peculiar sensation, and we can form an estimate of the weight of a body by holding it. This is sometimes called the *muscular sense*. When one sense is lost, the others seem in part to make up for it by becoming more acute. Thus a blind person has a more delicate touch. This arises probably from the fact that persons who have lost one sense are compelled to cultivate another. All the senses are susceptible of cultivation to a greater degree of acuteness by careful and constant exercise. I say careful exercise, for great and sudden efforts often strain the delicate organs. Thus the man who uses the microscope is capable of seeing minute parts which the ordinary person will not see at all, and the sailor and the hunter will perceive objects at greater distances than other persons.

PART II.—RIGHT LIVING.

CHAPTER I.

HYGIENE.

In the Grecian mythology Hygiea was the goddess of health. From this name comes our English word *Hygiene*. It is defined as the science which treats of the preservation of the body in a state of health. Health is that condition of the body in which all the organs are performing their proper functions unobstructed by foreign particles or forces. In this condition there is a just balance between supply and waste. When fuel is burned in the stove, the force we call heat is produced by the chemical action of the carbon with the oxygen of the air. In this process there is a change of matter, new substances are formed, and old ones are destroyed. When food is taken into the system it is changed into new substances, and the tissues of the body having served their purpose, are again destroyed and thrown out of the system in the form of still other substances called waste matter. This change of matter produces animal heat, and vital power exhibited in muscular and nerve force. Every contraction of a muscle is at the expense of destruction of muscular tissue, and every thought and emotion is at the expense of destruction of nervous tissue. If the waste material is not removed as fast as it is formed it becomes a foreign body, and a source of obstruction to the vital functions.

This fundamental principle of supply and waste should lie at the bottom of all rules for the preservation of health. Dr. Fothergill defines health as "a balance betwixt the various parts of the organism, in power as well as in function." "Health," says he, "is no more the endowment of the man whose brain, active and restless, tyrannizes, in reiterated demands, over the body, its patient, enduring bond-slave, than it is the possession of another person, whose inefficient digestion leaves the system ill-fed and famished, the prey of depression or neuralgia."

When one is not conscious of possessing organs or parts, except as he voluntarily directs his mind to them, he is in a state of perfect health. In other words, when an organ is performing its proper function unobstructed, it gives no evidence of its existence in the way of pain or uneasiness. This is usually a test of health, but there may be exceptions. A poison may exist in the blood, or there may be a peculiar tendency to morbid or unhealthy growth or action often inherited, which may not manifest itself to the senses for a long time, yet continue to undermine the foundations of the system. There are perhaps, no human beings who are in a state of perfect health unless it be for limited periods. The seeds of disease are planted often in our systems through inheritance from parents or grandparents, or from generations more remote, and the causes of disease lurk external to our bodies on every side. In the air we breathe, in the water we drink, in the food we eat, there may be the seeds of poisons which will destroy the system. Extremes of heat and cold, too much exercise, or the want of it, improper quantities of food and drink, indulgence in narcotics or stimulants, indulgence of appetite and passion, are causes which undermine the constitution, and interfere with vital functions.

There have been many adverse opinions promulgated

in regard to the maintenance of health, and almost every writer on Hygiene has made a hobby of some particular theory or principle. Some seem to think that attention should be paid mainly to diet, others to bathing, others to exercising, and so on, and schools or sects have thus arisen with their respective creeds. Most of these schools have been, it is true, schools of medicine, but based as they all claim, on principles of hygiene. A collection of all the various adverse opinions in regard to the maintenance of health and the cure of disease by hygienic measures, would be one of the great curiosities of literature. The tendency of most writers has been to carry matters to the extreme. There is a golden mean which, if we can strike, will insure successful results.

CLOTHING AND SHELTER.

Man is not provided with a coat of fur or feathers as all other terrestrial warm-blooded animals are. The whale is a warm-blooded animal with a naked skin, but its home is in the water which never reaches a temperature below that of thirty-two degrees, and besides it is protected with a thick coating of fat beneath the skin. Man then must provide artificially a substitute for the natural covering, or be content to dwell altogether in tropical regions.

Although the human being can for a short time maintain life under great extremes of temperature, yet the limits of temperature within which a man may maintain a healthy condition are not very far apart. The body is continually manufacturing and imparting animal heat. If the surrounding atmosphere be considerably below that of the body, the heat is abstracted too rapidly, and the individual suffers from cold, and the vital actions are interfered with. If the temperature of the surrounding media be the same as that of the body, the heat is not conducted

away as fast as produced, and the individual suffers from heat, and the vital functions are not properly performed. If the temperature of the surrounding media be higher than that of the body the system suffers not only from the excess of animal heat, but from the direct effects of the external heat. Clothes prevent too great a loss of animal heat, because they are made of materials which are poor conductors of heat. For the same reason they are a partial protection from extreme external heat.

The animal heat is produced by the destruction of the materials of the body. The relation between the amount of heat and the matter of supply and waste is apparent. Food supplies the waste of the system. The wasting process is accompanied by heat. The more food within certain limits, the greater the amount of heat. The colder the surrounding media, the greater the loss of heat. Hence the necessity of food to the maintenance of heat. Clothing prevents the loss of heat. Thus clothing takes, in a certain degree, the place of food by conserving the heat produced by the food. Hence, we require more food in winter than in summer, more when scantily clothed than when well clothed. But it is poor economy to spare the clothing and to try to make up for it by eating an increased quantity of food, for this is only giving the organs of digestion and assimilation increased work, and we tend to destroy the just balance which should exist between the cause and effect. The more work we require of the system beyond certain limits the sooner it is worn out, and unfit for further service. Rather clothe ourselves better and then we will require less food.

The material for clothing should depend upon the season and climate. In extreme northern climes, nothing but furs will keep the body from freezing when in the open air. Next to furs in power of retaining the animal heat is

woolen cloth. Woolen goods are best adapted for winter wear, and for northern climates. Men who work before furnaces exposed to the radiated heat find it more comfortable to wear flannel, as it protects them from the external heat. Some claim that a flannel shirt is cooler in the hot sun of the harvest field than one of cotton or linen. For summer wear cotton is the best article, being a much better conductor of heat than wool. Linen has even greater conducting power than cotton, but linen underwear is often uncomfortable after it is saturated with perspiration because of its rapid dispersion of the heat of the body. Clothes made of a mixture of cotton and wool are very suitable for the more temperate portions of the year.

We need more clothing while asleep than while awake, because the body gives off heat more rapidly during sleep. We also need more while quiet than while exercising. The person exposed to extreme cold dies if he permits himself to go to sleep. The one who keeps awake and in action may survive. Blankets of wool or coverings of fur or feathers are better to sleep under, as we can get more warmth with less weight, than with cotton bed-clothes. The German fashion of sleeping under a feather bed is not a bad one in cold weather. But to sleep between feather beds is usually an extreme, and the body is relaxed by the too great heat. In fact, sleeping *upon* feather beds is not a good custom, except in extremely cold weather. It is frequently the cause of debility of the system. A spring bed covered with a hair or shuck mattress, or a straw tick, is the best kind of bed.

Some parts of the body require more protection from the cold than others. The feet, the chest, and the abdomen should be especially protected. The feet are farthest from the center of circulation, and are exposed to damp-

ness and need especial care. Cold and damp feet not only cause discomfort, but often result in fatal disease. Leather is, perhaps, the best protector for the feet. If good it does not readily absorb water and adapts itself to the form of the foot. It, however, absorbs to some extent the perspiration, and in this respect is much better than India rubber, which, while excluding external moisture, retains all the perspiration. Stockings should be well aired and dried at night to remove the moisture absorbed from the feet. For some persons cotton stockings are best both summer and winter, as frequently the feet perspire readily with woolen stockings. Cork insoles are good, especially for persons whose feet perspire freely. They should be taken out at night and well dried. Thick-soled shoes keep out the dampness but are tiresome to the feet from their stiffness, and for the same reason wear out much faster than thin soles. The problem of how effectually to prevent moisture entering from without to the feet and at the same time to effect discharge of the perspiration, is one which has never been solved. Rubber boots or shoes are frequently absolutely necessary, but one should avoid if possible wearing them very long at one time.

The chest and abdomen containing the vital organs, need to be protected. Disease of the lungs is often consequent upon exposure of the chest to cold winds. The fashion of low cut vests and coats for men is not a good one in cold weather. Dysentery and other affections of the abdominal organs are often produced by chilling the abdominal region. The blood is sent from the surface, and tends to congestion internally. Sudden attacks of diarrhoea and cholera morbus are often attributed to the food eaten, when the cause is in chilling of the surface, producing a recession of blood to the stomach and intestines, causing congestion and disturbing their functions.

One should always avoid getting chilled. The cold which bites our fingers and faces does not do any particular harm unless it gets so severe as to freeze the parts, but a general chilling of the body is always injurious. A shock is produced upon the nervous system and unless reaction comes up soon, a "cold" or more serious consequences results. Persons exercising are not apt to become chilled but may be when sitting still, even when the temperature is not very low. One should wear heavier clothes while riding in the open air unless the weather be very mild, and on damp, chilly days should not sit in a room without fire. If engaged in reading or writing, often we may not notice the cold until we are thoroughly chilled. The judgment and not the feelings should be consulted in these cases. A fire, especially an open one on damp days is frequently very desirable, even in the warmest months of summer in our temperate climate.

Rooms should be so constructed as to avoid drafts in cold weather. The stove, or heating apparatus should be near the door, or other place where cold air enters, in order that the air may be warmed before it circulates through the room. Cold drafts of air when the body is relaxed by heat, are very injurious.

Habit has much to do with regulating the amount of clothing and endurance of external cold and heat. The man who habituates himself to an outdoor life can endure more cold than one who works indoors. Some persons accustom themselves to wearing thin clothes, and others to wearing heavy clothes. Again, as the weather gets gradually colder in the fall we acquire an ability to withstand cold consequent upon the power to manufacture more animal heat, and in the spring we, on the other hand, gradually acquire power to withstand heat. Thus we have what is called the *winter constitution*, which is followed by

a *summer constitution*. We can then, endure more cold in the winter than in the summer, and more heat in summer than in winter. Therefore, we need more clothing in summer than in winter when exposed to the same temperature. Persons who stay much in warm rooms in the winter do not receive the winter constitution, and therefore should dress warmer when they go out of doors.

Children and old persons, and persons of a delicate build, require more clothing than adults of stouter structure. The children of the poor in our large cities suffer perhaps more from insufficient clothing than from insufficient food. One of the great causes of physical degener-



FIG. 265.—Foot Deformed by Tight Shoes.



FIG. 266.—Foot in its Normal Condition.

acy is undoubtedly insufficient protection from extremes of temperature. The old idea of hardening children by dressing them scantily, dipping them in cold water, etc., is no longer entertained by intelligent persons. The child needs a proper temperature in which to develop a vigorous manhood as much as he needs proper food and exercise. The experience of ages has demonstrated that man will not attain his highest physical and mental development amidst the extremes of either heat or cold. The superior nations are found in temperate climates. The time may come, however, when man shall have so learned to protect himself from the extremes of climate, that he can maintain

his physical and mental vigor as well beneath a torrid sun or the frosts of the frigid zone as in the temperate climes. It will be simply another triumph of man over Nature, of mind over matter.

In the direct rays of the sun, black clothes are the warmest because they absorb heat, and white the coldest because they reflect heat. This power of absorbing the sun's rays varies with the degree of shade, the darkest colors being greatest.

In regard to tight lacing and the wearing of tight boots little need be said. Every sensible person knows that to compress the abdominal organs by cinctures cannot fail to produce sooner or later injurious results. Feet which are inclosed in boots or shoes so tight that the toes must over-lap each other in order to have room, are certainly not in a normal condition. But the majority of those who indulge in these luxuries (?) know that they are injurious, and I am not writing for that class.

AIR AND SUNSHINE.

Closely connected with the subject of clothing and shelter, is that of air and sunshine. While attempting to protect ourselves from extremes of heat and cold, we are apt to deprive ourselves in a measure of these two important essentials of a healthy condition. The importance of a constant supply of fresh, pure air for the lungs needs no demonstration to persons of ordinary intelligence. But while even the most ignorant seem to realize the importance of pure air it is an undeniable fact that entirely too little attention is paid to the matter of securing proper ventilation.

By pure air we mean air which contains only those elements which are found in air of all parts of the earth, viz., *oxygen*, *nitrogen* and a very small proportion of *car-*

bonic oxide, with some *watery vapor*. These constituents are found in all out-door air in an almost unvarying proportion. The oxygen is essential to animal life, but requires to be diluted to a certain degree with an inert substance. This inert substance is nitrogen. If an animal be placed in a vessel of pure nitrogen it will die not from any direct effects of this gas, but from want of oxygen. The carbonic oxide is poisonous to animal life when taken in any great quantity, but the small amount existing in the air has very little effect upon the animal, although it forms much of the food of plants, which in turn, give off oxygen for the support of animal life.

According to the evidence of geology, there was a time in the history of the earth when the atmosphere was heavily loaded with carbonic oxide, and only the lowest forms of animal life which require very little oxygen, could exist, but plants flourished in abundance, and by their decay formed the immense coal beds which we use for fuel to-day. This carbonic oxide was removed from the atmosphere by the excessive growth of plants, and thus the earth was prepared for the advent of higher forms of animal life, forms requiring more oxygen, and easily injured by an excess of carbonic oxide. To-day there seems to be a just balance between the two great kingdoms of organic nature, the animal and the vegetable. Man stands at the head of animal life. He requires pure air, that is, air with maximum amount of animal food, or oxygen and the minimum amount of vegetable food, or carbonic oxide. You may seal up a snake in a quart jar and it will live for six weeks, or longer, on the oxygen therein contained, but shut up a man in a room proportionally large and exclude external air, and he dies in as many hours, having consumed all the oxygen.

A human being renders the air he breathes unfit for

breathing again by depriving it of part of its oxygen, and imparting to it a portion of carbonic oxide. The air is thus not only deprived of part of its essential element, but is poisoned by the addition of an element injurious to the system. But the lungs of animals are not the only sources of this gas. It is produced by the burning and by the decay of most animal and vegetable substances. The smoke stacks of our foundries and factories and the chimneys of all our houses are pouring forth constant streams of carbonic oxide into the atmosphere. Lamps and gas jets burning in a room produce a large amount. The air in the vicinity of factories and in large cities is consequently more heavily charged with this gas than the air of other localities. In some volcanic regions it is given out of the earth. But vegetation is constantly using it so that the relative amount remains very nearly the same at all times. With a few exceptions, it does not accumulate in places to any great extent, because the atmosphere is in constant motion, and all gases have a tendency to mix by *diffusion*. The exceptions are in cases of deep mines or wells which have been neglected for a time, or where it issues in great quantities from the ground in volcanic regions.

Neither is carbonic oxide the only poisonous gas which may contaminate the atmosphere. *Ammonia*, *hydrogen sulphide* and other gases are produced by the decay of vegetable and animal substances, but these are dissolved by the rains and absorbed by the soil, and finally are used by the growing plants. Like carbonic oxide they only become dangerous when they exist in excess in the atmosphere. The human body itself gives off through the lungs and skin certain poisonous gases, and in many diseases the germs of the disease are given off in the form of minute particles which float in the air. Deleterious gases escape from factories, slaughter houses, and from privy vaults.

NECESSITY OF VENTILATION.

The first problem for us to solve is how to get rid of the products of respiration and secure constantly a proper supply of oxygen for the lungs. It must be remembered that carbonic oxide is, when cold, a little heavier than air, and tends to settle toward the earth or lowest part of the room, but when warmed to the temperature of the body it is lighter than air, and rises. Place a number of persons in a tight room when the temperature is below that of the body. The exhalation from their lungs at first rises and accumulates near the ceiling, but gradually cooling to the temperature of the room, it descends, and reaching the level of the mouth is again inhaled, mixed with the pure air. Now if an exit were made at the top, this impure air would pass out before it had time to cool. Then, if there were an opening at the bottom also, cold pure air would rush in to take its place. If no opening at bottom there would be two currents established side by side at the top, one of cold pure air coming in, the other of warm impure air passing out.

If the air of the room is as warm as the body the exhalation does not rise but diffuses itself throughout the room, and will pass out at any exit because the air outside is heavier and rushes in. To secure good circulation of pure air there should be openings near the top and bottom of a room. If there were no other object to be secured than a free interchange of air, this would be all the care necessary. But as hinted in the first of this chapter, cold currents of air striking the body are very injurious. The question then becomes, how to secure free circulation of pure air in all seasons, without exposing the inmates to drafts. It was stated that the ingress for air should be near the heating apparatus, that the currents may be

warmed before circulating through the room. Many of our public buildings and private residences of the better class are scientifically ventilated, but the dwelling places and places of resort of the masses of the people are very poorly arranged to this end. The majority of school-houses, church buildings and private residences are so constructed that an attempt at free ventilation exposes some person in the room to a cold draft. A very cheap and effectual plan for ventilation, is to make an opening a few inches square in the floor beneath the stove or heater, this opening to connect with the air outside of the building by means of a wooden tube made by simply nailing together four boards; then another opening at the top of the room near the chimney, or into an extra chimney by the side of the one for the smoke. Then the air gets warmed by the stove, circulates through the room and passes out, and windows need not be opened unless to cool the room. When there are no such arrangements the opening in a window may be screened by a blind or by a board fixed so as to direct the current of air upward against the ceiling, breaking the force of the current.

DISINFECTANTS.

The next problem is how to get rid of the poisonous gases which infect the atmosphere generally. Remove the causes if possible. But how can this be done? It is not as well known as it should be that dry, powdered substances absorb both liquids and gases. Among the best materials for this purpose is dry earth. The ground is a great purifier. The most offensive substances soon lose their power when buried in the earth. It is true that when earth absorbs gases and liquids, it sometimes gives them off again to the atmosphere, but this is only when it is spread out and thoroughly exposed to the winds.

Liquids also absorb gases. This is known to many housekeepers. Milk when placed in a room with onions will have a flavor of these vegetables. Onions have a volatile oil, which, evaporating, passes into the atmosphere in the form of a gas. Vessels of water or milk may be used in the sick room to absorb the poisonous gases which may emanate from the patient.

One of the greatest evils in this country, and especially in towns of small size, is the presence of so many open privy vaults. It is true that the earth absorbs a certain amount of the excrement in the vaults, but not by any means all of it. But little attention is paid to this matter of destroying foul odors. Every water closet which is not connected with a sewer, should contain a box of dry earth and a small quantity should from time to time be thrown into the vault.

One of the best and certainly the cheapest disinfectants, then, is dry earth. Were a more liberal use of it made, disease would certainly be much lessened. The hog, we say, is a filthy animal, because he wallows in the mud. But the hog is a philosopher. This is his method of keeping himself clean. The mud absorbs the excretion from his body, and as it dries up it falls off and removes the offensive impurities.

Pulverized charcoal is one of the most powerful absorbents. Its use in filters to purify water is well known. If placed in a room it readily absorbs many of the injurious gases.

There are other disinfectants which remove foul gases by chemically combining with them, forming inert compounds. The best is chlorine in the form of chloride of lime, or bleaching powder. Chlorine is a greenish gas, which, when undiluted with air is injurious, but when set free in the atmosphere acts chemically upon many poison-

ous gases, and renders them and itself inert. A small quantity when diluted with air is not injurious, and will be sufficient to purify a large quantity of air. The best way to employ it is to place a portion of bleaching powder on a plate somewhere in the room, from which the chlorine will escape fast enough for purposes of disinfection, and not in quantity sufficient to cause any injury. Carbolic acid, chloride of zinc, lime, copperas, and many other chemicals are also used as disinfectants.

MOISTURE IN AIR NECESSARY.

Air containing a certain amount of moisture is better fitted for breathing than perfectly dry air. Too much moisture in the air on the other hand, seems to be deleterious. Lung diseases in their first stages are often cured by the air of a dry climate, but in the latter stages the dry air usually only aggravates the case. Again, persons with consumption often secure an extension of life by migrating to a moist climate. Temperature, however, has much to do with this. A cold dry air is stimulating to the lungs, while a moist, warm air is relaxing, and often depressing. When rooms are heated by stoves the air often becomes too dry for healthy breathing. Rooms heated by hot air furnaces are objectionable on this account, unless some means are employed to add moisture to the air. A vessel of water kept on the stove can do no harm, and its evaporation will lessen the dryness of the atmosphere of a room.

Ventilation of rooms is important at all times, but more especially so when an inmate is sick. But while I would impress the importance of a constant supply of fresh air I would caution against the admission of drafts. The patient often becomes uncovered in his restlessness, and perhaps while the skin is moist with perspiration, he is ex-

posed to a cold draft from an open door or window. An aggravation of his symptoms may be expected. The bed should be so placed as to be out of the way of currents of air, and the patient should be watched to see that he is not uncovered. The effects of radiated heat from a stove or fireplace are often injurious to a patient. When fire is needed in a room a screen should be placed between it and the patient.

AIR IN FACTORIES.

The atmosphere is often loaded with dust, or fine particles of matter. In our cities the solid, minute particles of carbon from the smoke of burning fuel, fill the air, and enter into the lungs along with the dust from the streets, from clothing, and from hundreds of other sources, yet the injury produced does not seem to be great, for the city resident is not more prone to disease which could be caused by dust, than the resident of the country. The dust in connection with certain industries, however, is very injurious, and a common source of disease. Among the occupations which are thus injurious, may be mentioned tool grinding, needle grinding, and the like, working in flour mills, baking, laboring in woolen factories, coal mines, and in the pottery works. Many occupations are attended with danger of inhaling chemical poisons, as in the manufacture of matches, wall paper where arsenic is used, and in those in which mercury, lead and copper are used.

Much has been done within late years to obviate these evils by better ventilation, use of disinfecting agents, fans, magnets and respirators to drive away, collect, or destroy the dangerous material. Persons who are compelled to be exposed to these evils may counteract their effects in great measure by scrupulous attention to the

other laws of health. Every occupation is attended with more or less danger to health. Either there is necessary exposure to extremes of temperature, to dampness, to impure atmosphere, or there is the tendency to and danger of, over-working one particular organ or set of organs; and he who takes the best care of himself possible under the circumstances, stands the best chance of long life and an enjoyable existence.

IMPORTANCE OF SUNSHINE.

The importance of sunshine as a health-giving agent cannot be overrated. Animals as well as plants grow pale and sickly when kept in the dark. The sun's rays impart a vigor to the system which cannot be supplied in any other way. The most vigorous people are those who spend much of their time out of doors in the direct rays of the sun. It is true, the sun may be injurious to persons not accustomed to being out, and in hot climates during the middle of the day it is sometimes almost unendurable. But in most cases it will be found that those who succumb to "sunstroke," as it is called, are those who have violated the plainest laws of health with regard to eating and drinking, or in other respects have not taken proper care of themselves.

Let the sunshine into your rooms, and around your houses. Too many shade trees too near the house are not healthful. The ground is kept damp, and sunshine cannot get in to purify the surroundings and vivify the inmates. Many chronic diseases are benefited by placing the patients frequently in the direct rays of the sun, giving them a sun bath, it may be called. Children should be allowed to play in the sunshine if they desire it. Their own inclinations should be consulted here unrestrained by the fear of too particular mothers, lest they get tanned.

BATHING AND CLEANLINESS.

"Cleanliness is next to godliness." A little more preaching from this text should take the place of many sermons we hear. While one cannot be too cleanly, yet he can overdo the matter of bathing. It must be remembered that water is not the only cleansing agent. A liberal use of water, soap and disinfectants, and some well-directed labor are necessary to keep our surroundings clean enough for the condition of perfect health. The Bushman gets rid of any dirt which may discommode his fingers, by wiping it off upon his naked arms, sides, or breast. He uses no water upon his body. A civilized man wonders how these savages can exist under such conditions. But when we consider that the savage spends most of his time in the open air, takes exercise like the animals, and has but little care on his mind, we can see how these conditions may make up in part for the violation of the laws of health relating to cleanliness. But the lowest savages are far from being models of health, strength and longevity, a popular notion to the contrary notwithstanding.

In the days of Queen Elizabeth, the floors of the houses, even of the rich and noble, were covered with straw, and the bones and other remains of the meal were thrown under the table. To-day we take some pains to remove offensive substances, yet we have not by any means reached perfection in this direction. Slops from the kitchen are thrown into the yard, garbage of all kinds rots in the gutters, our sewers often open within fearful proximity to dwellings, the refuse of slaughter-houses is poured into rivers and we drink the water, or it is allowed to decay in the vicinity of habitations, and the excrements of animals and human beings are left to pollute the atmosphere on every hand. Everything of this nature

should be far removed from human habitations, burnt, buried or neutralized by chemical or physical disinfectants. A rigid enforcement of a law requiring this might prevent an epidemic.

All that has been said about purifying the air of poisonous gases, will apply to purifying houses, cellars and surroundings generally. Better pay a small sum for disinfectants than a large sum to the doctor. Soap is cheaper than pills, and far more agreeable.

But the most injurious dirt is the waste material of the body. All waste matter of the system is poisonous,—the perspiration, the expired air, the excretions of the intestinal canal and kidneys, and if absorbed and carried into the circulation, produces disease. If a man will pay scrupulous attention to this matter of removing all excretions of the body he may enjoy reasonable health even if he violates to a considerable degree every other law of health.

A very large proportion of the waste matter is thrown out through the pores of the skin. The absorbent vessels are numerous in every part of the surface. If the material excreted by the sweat glands be not removed, it is liable to be again absorbed by these vessels, and carried into the blood to poison the entire system. Foreign material in a soluble form may also be absorbed by the skin. Hence the necessity of keeping the skin clean, and a frequent change of underclothing. Bathing in cold water gives first a shock to the nervous system and sends the blood to the interior organs. In persons of vigorous health, this does not seem to do harm, especially if they exercise the limbs and rub the surface vigorously till an agreeable glow of warmth follows the chill. But if a reaction like this does not follow quickly upon the first chill, there is danger. Hence many persons are injured by a cold bath.

Bathing in hot water, or water above the temperature of the body, has the effect, first of stimulating the nervous system, but this stimulation is followed by some depression, and the result is a languid feeling and drowsiness. Hence, unless in certain conditions of disease, bathing in hot water is not to be recommended. Local hot and cold baths, that is, hot or cold water applied to certain limited portions of the surface are often very beneficial in diseased conditions, but in health they are not needed, and for the reasons just stated, general cold or hot baths are not best for the maintenance of health.

Bathing the whole body in water of a temperature agreeable to the feelings,—and this temperature is usually considerably lower than that of the body itself—produces no injurious effect, unless too frequently repeated, and accomplishes two desirable ends: (1) it removes the secretions of the body and external dirt, and (2) it relaxes the skin, opening the pores.

Besides the secretions of the sweat glands (see fig. 254 page 592), the sebaceous, or oil glands are constantly pouring out an oily fluid which, after it has answered the purpose of lubricating the skin, becomes a source of injury, since from the viscid nature of the secretion it catches the dust of the atmosphere and forms a gummy mass which clogs the pores and prevents the excretion of the perspiration. The outer cells of the epidermis are also constantly being pushed off, and their place supplied by new ones from beneath. One object then, of bathing the skin is to remove these materials. Soap is an alkali, which dissolves the oil and loosens the dirt.

For purposes of cleanliness the entire body should be bathed at least once a week in winter, and oftener in summer. Once a day in warm weather is not too often. Persons who work in dust and perspire freely should bathe

every evening just before retiring. More frequent bathing than this is not good as it relaxes the system too much, and tends to make the skin highly sensitive. Neither is it good to remain too long in a bath. Ten minutes or at most fifteen is long enough, and if the water be not of an agreeable temperature, a much shorter time is better.

An amount of water sufficient to immerse the body, is not necessary for a good bath. A gallon of water with a good sponge or soft cloth is sufficient for a thorough bath. The application of the water should be attended by pretty vigorous rubbing, to be followed by thorough wiping with a dry towel. Many persons imagine, a bath to do any good, must consist in soaking the body in water, and seldom being so situated as to be able to enjoy that luxury, they go from month to month without allowing water to touch their bodies. When such persons get down sick with a continued fever, it is not strange. The poisonous excretion of their bodies has continued to circulate with their blood until nature makes an effort to throw it off, and we call this effort a fever. I will not exaggerate when I say that nine-tenths of the fevers are caused by want of personal cleanliness. It does not follow that every one who is filthy will have fever, because nature has many ways of removing offending material, but it is always at the risk of producing disease. So it is impossible to predict what will be the result of a violation of any law of health, but we may rest assured that we shall pay the penalty in some form for all such violations.

A bathing tub, or tank in which the body can be immersed, if kept in every house, would be a luxury but not a necessity, for reasons above stated. The most agreeable kind of bathing is that furnished by a running stream or pond of clear water when the weather is warm, but it can not be enjoyed by all persons. In regard to the time of

bathing, it makes but little difference with a healthy person, yet it is generally not best to bathe immediately after eating a hearty meal, as the blood is taken from the digestive organs where it is needed, to the skin.

It is commonly supposed that it is injurious to go into the water while the body is warm. While there may be danger of a shock if the water is cold, there is more danger when the body is cooled too much, because the system having already lost much heat, cannot bear to lose more by the cold water. A better rule is not to go into cold water at all unless feeling very vigorous, but always choose water near the temperature of the body.

CHANGE OF CLOTHING.

Just as important as bathing is the frequent change of clothing that is worn next the skin. The excretions from the skin saturate the underclothing and if the latter is not frequently changed the material is liable to be absorbed again. A thorough airing of clothes is almost as good as washing them, as far as removing the exhalations of the body is concerned. The same clothes should not be worn next the body at night that are worn in the daytime. It is a good plan to have two sets of underclothing, the one to be worn in the daytime the other at night, and while the one is being worn the other can be airing. To air thoroughly they should be hung up unfolded where there is free circulation of air.

Bed-clothing should be aired during the day. The practice of making the bed in the morning as soon as the occupant has left it, is not a good one. The windows of a bed-room should be thrown open in the morning and the bed-clothes turned open to expose them to the air during the day. This is not always practicable where persons are compelled to sleep and live during the day in the same

room. In such cases two sets of sheets might be used, alternately hanging the one out of doors, or in a vacant room.

TIMELY EVACUATIONS.

A fruitful source of disease is the retention beyond a proper period of the waste material of the intestines. Thousands of persons are suffering daily from constipation which is not only an evil of itself but a cause of multiplied evils. Let us consider for a moment, the philosophy of this question. Matter retained in the intestines beyond a certain period first loses a large portion of its water by absorption. This water contains portions of the fœcal matter in a state of solution, and it circulates through the system, and must be thrown out through the skin or lungs. If it were not a poison of itself it would injure the system by thus giving other organs extra work to do. But it is a poison like all other waste products, and so is a double evil. That this fœcal matter is thrown off through the skin of persons who are habitually constipated is shown by their odor. Some persons who are otherwise cleanly in their habits possess this fœcal odor, and the cause will always be found in habitually constipated bowels.

The removal of the water from the fœcal matter makes it hard, and it thus becomes a source of irritation to the delicate walls of the intestine. This irritation may cause various troubles. By reflex action it often induces nervous disease which may manifest itself in remote parts of the system. It may also cause local inflammation. Again, the sigmoid flexure of the colon is the proper, natural receptacle of the fœces until it is discharged. When evacuation does not take place within the proper time, this material is pushed on into the rectum or lowest intestine, where it becomes a source of various diseases. It may

produce piles and other diseases of the rectum itself, or by its crowding upon other organs induce disease in them. The latter is especially the case in females. Many of the diseases peculiar to females may be traced to displacements of organs produced by constipation.

But what is the cause of constipation, and what is its cure? In most cases constipation is caused by want of cleanliness, in other words by neglect to answer the calls of nature to remove the offending waste matter. It is true that improper food sometimes causes it and often it is produced by medicines or by other causes which we cannot stop to mention here. With the majority of persons there is a call of nature to evacuate the bowels once in twenty-four hours. But often, instead of attending to it, we allow the demands of society or other frivolous causes to interfere, and by an effort of the will suppress the desire. Nature has a tendency to be periodical in her actions, and when the desire is suppressed it will not usually return again until the next regular period. By this time the material has lost its watery portion by absorption, and has become impacted, and the pressure thus produced has partially paralyzed the intestine and the desire will be very feebly shown, if at all. This in time destroys the power of the parts, and habitual constipation is the result.

Now, how do medicines act? Usually by stimulating the intestine to muscular activity. This unnatural and unaccustomed action finally results in greater or less paralysis of the parts, and thus medicines increase rather than cure constipation.

Now what is the remedy? Conscientious—nay, religious attention to the matter of regularly evacuating the bowels. By persistent effort at regular intervals a habit may be formed so that the desire will take place at about the same time each day. Occupation and habits of life

should fix the time. If any cause, as change of diet or taking cold should cause a failure of the bowels to act, steps should be taken at once to regulate them. Do not resort to medicine the first thing. Change your diet. If you have been eating constipating food, change to fruits and vegetables. (See section on Food.) As a last resort the use of a syringe or a mild purgative may be required. Purgative medicines should always be given in broken doses, and only the milder kinds without the advice of a physician. The neglect of the bowels for over two days ought to be considered criminal.

EXERCISE AND REST.

The human heart beats 70 times per minute, and may keep it up a hundred years, yet it rests as much as it works, for between every beat there is a pause as long as the beat. The stomach digests food for a few hours, then remains quiescent about as long. The nervous system is active during waking hours, but during sound sleep it is at rest. While in one sense ceaseless activity is the law of nature, yet there must be an alternation of motion and cessation of motion.

A healthy condition of the body depends upon a due proportion of exercise and rest. But we may rest one organ or set of organs while others are in activity, so that in one sense there is no *absolute* rest. Exercise, to be the most beneficial, should stop short of exhaustive weariness. The exercise which produces slight fatigue may not be injurious.

Dr. Jarvis well says: "The same quantity of exercise is not necessary for the health of all men and women, nor are all able to endure the same amount of labor. It must be measured out according to the constitution, the strength and the habits of various persons. What is

necessary for one may exhaust the other. The quantity of action should be determined, not by any previously established theory, but by its results in each case—by its effects upon each individual.”

Men and women do not suffer so much from want of exercise, as they do from want of a proper distribution of exercise and rest. Men often put forth Herculean efforts to accomplish certain ends, and exhaust their strength, break down their constitutions, and then take a rest. Had they taken more time to accomplish the same end, had they taken their rest as they went along, they would have conserved their force, and in the long run have accomplished more. The student is often very injudicious. He will toil over his books for hours at a time, until, feeling that his mind is exhausted he thinks he needs physical exercise and he takes a long walk, or goes through a series of gymnastic exercises. The result is he breaks down in both body and mind.

A frequent change of work, a frequent alternation of exercise and rest is better than long-continued exertions with long intervals of rest, or steady application to one kind of work. The men who accomplish the most in a lifetime and enjoy the most vigorous health, are those who divide their time judiciously between exercise and rest, or make frequent change of exercise, which brings into activity each time another set of organs.

One should not take exercise merely for the sake of exercise. He should have some *object*, some end to accomplish. That exercise does us most good which does not seem to be exercise, which is pleasurable in itself, or is taken almost unconsciously while the mind is occupied in some train of thought which brings pleasure. It is true, however, that one's mind may be so occupied with thought, or so intent upon accomplishing some work that

he will overwork his muscles before he is aware. He will feel no fatigue until he has reached a certain degree of exhaustion. Persons often overdo themselves in this way, and this is a frequent cause of disease.

Certain organs are thus overworked, resulting in disease. A frequent cause of weak eyes is too long application of the eye to the same focal distance, as in reading, writing or sewing. Persons who are thus obliged to make use of their eyes, should frequently look about the room, or out of the window to give the eyes rest. Five minutes even is too long to keep the eyes fixed upon one object.

KINDS OF EXERCISE NEEDED.

I do not think much of *gymnastic* exercise. There is too much of the idea of exercising for the sake of exercise, about it. The mind is too intent upon requiring the muscles to go through a certain prescribed series of movements, and both mind and body are taxed. Besides, many of the prescribed movements are too severe for the persons who engage in them. Think of a man who has been accustomed to mental labor swinging a heavy club a prescribed number of times. He does not appreciate its weight and the muscular effort required to swing it, until some time afterward he is aware that his muscles are sore and stiff. Most persons are thus apt to overdo gymnastic exercises.

Neither am I in favor of exercising the muscles, however judiciously, to the neglect of other organs. A man cannot have the muscles of a prize fighter and the brain of an Agassiz at the same time. The muscles may be trained to great power, but it is always at the expense of the nervous system, and great muscular strength is inconsistent with mental power.

Base ball playing, boat rowing, and similar exercises

are objectionable for most persons because they tax too severely the muscular power for the time being. These sports are usually indulged in by students who are the least fitted to engage in them. The change from sitting in a room studying to the severe efforts made in these exercises is too great. Unless they spend much of their time exercising in this way, thus accustoming the muscles to severe effort, more harm than good is done. The student, or man of sedentary pursuits, needs gentle muscular exercise,—exercise which brings those muscles into action which are inactive when he is engaged in his regular work. The student of natural history who takes excursions in search of his specimens of plants, minerals, or rocks, gets the proper necessary exercise without danger of overdoing it. For this reason it would be to the advantage of the student in other lines to interest himself in some one branch of natural science merely as a recreation and relaxation from his regular line of mental work.

There are many clergymen, lawyers, merchants and others engaged in sedentary pursuits who thus find not only pleasure but health in making collections of natural history specimens, making this work not a part of their business, but merely a recreation, something for a change to get their minds off their regular work, and to give them exercise of a different kind. Thus, a certain lawyer of my acquaintance has lately become interested in making a collection of stone axes, arrow points, and other relics of the stone age. He carries in his pocket a small arrow point and when he meets a man from the country and engages in conversation, shows him the relic. The man becomes interested and tells the lawyer that he has a number of those in his house, or that he knows of a neighbor who has such articles in his possession. The lawyer visits these persons, and they, seeing he is interested in the

articles, give or sell them to him for a trifling sum. In this manner he has made a large collection in his own county.

I give this merely as an illustration of what might be done by many of our professional men who are complaining of overwork. This kind of recreation is better than taking a vacation once a year to some fashionable watering-place.

Active muscular exercise should not be taken immediately after a full meal. The blood and nervous energy is needed in the digestive tract, and active exercise of the muscles tends to bring the blood and vital energies to the limbs. Neither is it best to take severe exercise just before eating, as the system is then somewhat weakened by want of nourishment, and muscular exertion would still more exhaust the vital powers which are soon to be needed in digesting the coming meal. The habit of early rising and working before breakfast is not a good one. Severe mental exercise has a similar effect upon digestion, and should be avoided just before and after meals.

MENTAL WORK.

Statistical facts show that the majority of great mental workers have been long lived, disproving the popular notion that mental labor is exhausting. It is not mental *work*, but mental *worry* that kills. It is not the amount of mental work but the improper distribution of work through time that injures. It is the close application of the mind while the exercise of the muscles is neglected; it is the continued application of the mind to one train of thought, that wears out the brain.

Many great mental workers have had their peculiar modes of recreation. Darwin, to relieve his mind from the close application to study, read light fiction. Horace

Greeley played checkers. Salmon P. Chase played cards. Milton played the organ, and practiced sword exercise.

I do not wish to be understood as being a particular advocate of games and novel reading. They all have their proper place, yet what is equally true, they are nearly always indulged in by the wrong class of persons. Instead of making them recreation from more important study or work, they are too often used to kill the time of the idle and trifling loungers. The man who does a good share of work, either mental or physical, has earned the right and it is a duty to himself to indulge in the recreation of games and sports, and in reading light literature, but it is often the case that such persons have no taste for such things, which fall into the hands of those who had better be engaged in some more serious occupation.

Dancing is in itself a good and healthful, exercise for, perhaps, most persons, but as dances are usually conducted at late hours of the night, in heated rooms, and upon dusty floors, combined with the temptation to continue the exercise to an undue degree, it is not to be commended.

Riding on horseback is good exercise generally. It is partly passive and for this reason is good for persons who are somewhat feeble. Riding in a carriage is almost entirely passive, and is very beneficial to the feeble in strength. But perhaps the best kind of exercise for those who are able to bear it, is walking. Walking brings into action almost all of the muscles. The people of this country, as a rule, do not walk as much as they ought. To be beneficial it should be of frequent occurrence, and not too long continued at one time.

Children when left to the promptings of nature, generally take a sufficient amount of exercise of the right kind. Girls are often restrained from outdoor sports. This is

wrong. There is no good reason why girls should be kept in the house and not allowed to romp and indulge their natural proclivities to exercise their muscles.

The muscles concerned in respiration should have full play, consequently tight clothing and unnatural stooping attitudes should be avoided. Fashion rules with despotic hand. The protest of health writers for years, however, has had its effect upon the leaders of fashion, and it is gratifying to know that the fashions of the day are more in accordance with the principles of hygiene than formerly.

"Sleep," says Shakespeare, "knits up the raveled sleeve of care"—and Young designates it, "Tired nature's sweet restorer." There is both truth and poetry in these expressions. Sound sleep is refreshing to both body and mind. One cannot get too much natural sleep. The majority of persons do not sleep enough. It would be impossible to lay down any rules as to the amount of sleep. Some persons require more sleep than others. A man gains nothing by robbing himself of sleep. He simply robs himself of vitality. A man must gain during sleep what he loses by labor during his working hours.

All experience shows that the hours of darkness are the best for sleep. One should rise at daylight and retire sufficiently early to get enough sleep during the hours of darkness. There is another reason for sleeping during the darkness. Daylight is best for the eyes, and we should use as much of it as possible and not spend the mornings in sleep and the first part of the night in study or work. I am no advocate of early rising, if by that is meant getting up before daylight. The soundest sleep can be obtained just before daylight.

Sound sleep is unattended by dreams. Sleep is never sound when one retires with a very full stomach, neither when one retires hungry.

Never use narcotics to procure sleep, unless under extreme circumstances of disease. Let the physician always be the judge as to whether narcotics should be used. Persons are often kept awake even when in good health by allowing their minds to dwell upon their business or social affairs. While one cannot by effort of the will stop thinking, yet he can direct his thoughts in other channels. Let the thoughts be diverted as far as possible from the ordinary channels. Try to recall some pleasing events of the past, build air castles for the future, or let your mind wander anywhere outside of the current in which it has been during the day.

One often wakes in the middle of the night and cannot go to sleep again from a peculiar sort of bodily feeling. This is often the result of having been too warmly covered. The remedy for this is to get up, throw open the bedclothes and walk around the room undressed for a few minutes. Dr. Franklin used to get up in the night, take off all his clothes and walk around or sit at his table and read or write for a little while, then go back to bed and sleep soundly until morning. This he called, "taking a tonic air bath."

Sleeplessness is a frequent cause of insanity. The nervous system is repaired while one sleeps soundly. Insanity is but a giving way of the nervous system caused either by some peculiar blood poisoning which destroys the nerve structure, or over mental work, or care which uses up nerve fiber. Sleep truly "knits up the raveled sleeve of care."

As a fitting close to this section, I wish to insert without comment, the following from a recent lecture by Judge Tourgee :

"Not to rest is one of those sins that brings its punishment on the spot ; not to rest is to cripple at the outset all

that power that God has given to man ; not to rest is to label man at the very outset, at the very instant, both as a weakling and a fool. By rest I do not mean the mere act of sleep ; by rest I do not mean the mere absence of occupation, even ; by rest I do not mean simple, unadulterated loafing ; by rest I do not mean anything that a lazy man can know. The lazy man may loaf, he cannot rest; he may slosh round, he may do nothing as if he had a divine calling to do so, but rest he cannot. Rest is that change of occupation ; rest is that relaxation of attention; rest is that putting of the mind in a new channel, or in a new course that gives to the over-strained nerves—that gives to the worn body—that gives to the weary heart, relaxation. A man may rest and work like a horse all the time ; a man may do more resting than most people ever dream of, and yet do more work than most of us ever know of."



CHAPTER II.

HYGIENE (CONTINUED).

FOOD AND DRINK.

I am not inclined to give this subject a more important place than the others I have discussed. Many hygienic writers, however, seem to think health depends almost entirely upon the kind of food, the quantity and the manner of preparing and taking it. My observation and personal experience, on the other hand, teach me that if one obeys the laws of health regarding temperature, fresh air, exercise, sleep and cleanliness, and avoids stimulants and narcotics, great license may be allowed in matters of diet.

I shall, therefore, lay down no particular system of dieting, but attempt to state a few common sense principles which ought to govern us in this matter.

Man is truly an omnivorous animal. He can adapt himself to a very great variety of food. One of the first promptings of nature is to take food. Appetite, then, in general may be taken as a guide, subject to certain restrictions consequent upon our surroundings. It is commonly supposed that the lower animals never make any errors in diet. While it is true that when they choose their own food they are generally exempt from diseases of the digestive organs, yet they not unfrequently suffer from food which does not agree with them. Man should use his

reason and knowledge as a check and aid to his natural appetite.

QUANTITY OF FOOD.

The quantity of food proper for an individual depends upon a variety of circumstances. Children and youth require more food in proportion to their size than adults, for the obvious reason that they need food, not only to supply waste, but to maintain the growth of their bodies. The size of the individual undoubtedly has something to do with the amount of food. As a rule, men consume more food than women, and large men more than small men. The constitution of the person modifies the quantity of food; those of a strong, robust build have greater power of digestion, and hence demand more food than those naturally more feeble. The state of health also must be taken into consideration, usually the healthy person requiring the most food. A person convalescing from a long and wasting disease requires a large quantity of food.

Habits of eating make a marked difference in the quantity of food actually required. One can so accustom himself to eating large quantities that the system seems to adapt itself to the conditions and loses the power to some degree of appropriating all the nutritious portions of the food, and yet he cannot be said to be in an unhealthy state. On the contrary, a habit of abstemiousness may be formed, and the digestive organs acquire the power of extracting all of the nutritious elements, and thus requiring a less quantity.

The more concentrated the food, that is the richer it is in nutritious elements, the less the quantity required. Experience shows, however, that the digestive organs usually act better upon bulky food than upon food too highly con-

centrated. The surrounding temperature may compel a variation in the quantity of food. More is usually required in winter and when thinly clad (see Clothing and Shelter.) The amount of food should vary with the occupation. Those who use their muscles in severe labor require much more food to supply the increased waste, than those who are engaged in sedentary occupations. A lady who kept for a time boarders composed of laborers who were building a railroad, and afterward boarded a number of students, declared that the laboring man ate at least four times as much as the student.

It is an old saying that one should quit the table hungry. This is not advisable, yet we often eat just because it tastes good after the appetite is appeased. For this reason too great a variety of victuals at one meal is not best, as the organs of taste are tempted after the appetite is gratified. It is true, however, that a mixture of several kinds of food usually digests better than a single kind.

QUALITY OF FOOD.

In regard to the *quality* of food little need be said here. The reader is referred to the chapter on Digestion, page 658. A little of my own experience may be worth something here by way of illustration. I have always been a tolerably large eater. About ten years ago I began to have symptoms of dyspepsia. I tried medicines with no result, also lessening the quantity of food. This only seemed to make the matter worse. Then having read some of the arguments for a vegetable diet I concluded to become a vegetarian. I began at once, eating nothing but vegetable food, except milk, butter and eggs, which are not prohibited by vegetarians, not being regarded by them as strictly animal food. I began to improve, and in less than a year I was completely cured, and could eat any

kind of vegetable food without producing any distressing symptoms, and could eat all that my appetite desired. Being now convinced that vegetarianism was the thing, and having lost all desire for meat, I kept it up strictly for five years longer, during which time I enjoyed perfect health and accomplished a considerable amount of both physical and mental labor. Finally, an almost uncontrollable desire possessed me to partake of some chicken broth I was about to give to a sick person. I yielded to the temptation, but I have never had occasion to regret it, for since that time I have been an omnivorous feeder, and have enjoyed perfect health.

Now I explain my cure in this way. I had eaten more than the system could digest, the digestive organs were overworked, and dyspepsia was the result. Vegetable food is more bulky, containing less nourishment to the same amount of material and while there was as much material as before taken into the stomach there was really less food to be digested, and the organs got a rest and regained their power. The experience of vegetarians proves simply that man can live and be healthy without animal food, but it does not prove that animal food is injurious.

In the winter we should use more *carbonaceous* food, or food containing starch, sugar and fat. These we find in most vegetables, the starch more especially in wheat and corn bread and potato. In summer we need less carbonaceous food and thrive better on fruits, lean meat and watery vegetables. Eggs and milk contain a proper proportion of the heat-producing and tissue-producing material, and one can exist longer on these articles alone than upon any others. Cheese is very highly concentrated food, containing both heat and tissue-making material. It is objectionable to most persons when eaten in quantities, because it is apt to produce constipation.

It is the opinion of some very good authorities, among which are Drs. Carpenter, Hooker, and J. Hughes Bennett of Edinburgh, that a deficiency of fatty elements in the food is a prime cause of tuberculosis or consumption.

Some kinds of food are more easily digestible than others, but experience shows that the most easily digested food is not necessarily the most wholesome. The stomach requires exercise as well as rest, and food too easily digested does not give the digestive organs enough to do. For this reason soups are not best as a constant diet, though very useful to afford variety.

The appetite demands a variety of food. The most palatable articles become disgusting when their use is long continued. Nature provides a profuse variety in the various grains, seeds, nuts, fruits, vegetables, milk, eggs, and the varieties of animal flesh. But the variety should be from meal to meal, or from day to day, and not at one meal, for reasons before stated.

FREQUENCY OF MEALS.

As to *frequency of meals*, almost universal experience shows that three times in the twenty-four hours is about the proper division of time. But habit often renders four or two meals per day just as congenial to the system. Children require food oftener than adults. Meals should be regular. It is not good to have meals regularly three times a day through the week and then change the hours and have them but twice a day on Sunday. The digestive organs are inclined to be periodical in their action, and are in the best condition to digest food when it is given at regular intervals. It matters little what the hours are so that they are the same every day, and do not come too soon before the hour for sleeping. Digestion goes on during sleep, but if articles difficult of digestion, or a

large quantity of food be taken just before retiring, sleep is more or less disturbed, as is shown by disagreeable dreams. The habit of eating between meals is universally condemned, and for the obvious reason that the stomach needs periods of absolute rest.

The *temperature* of the food should be neither high nor low. Hot foods and drinks render the nerves of taste less sensitive, and ice cold articles often chill the stomach, reducing its temperature too much below that necessary for digestion. Ice-cream is a luxury which many of us pay dearly for in that which money cannot furnish. In feverish conditions ice is often beneficial as well as agreeable, but in the normal condition of the system it is usually more agreeable than beneficial.

Eating too rapidly is injurious, first, because the food is not properly masticated and mixed with saliva, second, we are not able to judge of the quantity of food, and are apt to eat too much.

COOKERY.

There is room for the exercise of scientific principles in the kitchen. While oils and fats are beneficial to the system when taken separately, or not intimately mixed with other food, they are indirectly injurious when thoroughly mixed with certain kinds of food, because they render such food insoluble in the juices of the stomach. When flour is intimately mixed with a large quantity of fat it is not so readily separated in the stomach, and can not be acted upon freely by the gastric juice. When meat is fried in grease which is not very hot it absorbs a large quantity of the grease, and is consequently tough and insoluble. The proper way to fry meat, or in fact any article, is to put it in very hot grease. Then the outside becomes crisp and is rendered impenetrable to the grease

and only the heat penetrates the interior. If allowed to remain in the grease awhile it will gradually become soaked through.

Potatoes are often made soggy and unpalatable by being fried in warm (not hot) grease, or boiled by putting into cold water and allowing it to heat gradually. To cause the cells of the potato to burst and discharge the starch granules they should be put into boiling water which should be kept at that temperature until they are done, and then they should be taken out or the water poured off.

Pies and cakes might, to a great extent, be dispensed with, and more fruit, sugar, cream, cheese, etc., be used in their stead. Though somewhat difficult of digestion, and not agreeing with some stomachs, the mischief from their use arises more frequently from the fact that they are eaten at the close of the meal, after one has eaten a sufficient quantity of food already.

Objection is made by many hygienists to the use of condiments, such as pepper and spices; even salt is proscribed by some. An excessive use of condiments is no doubt injurious, but when used in moderation they give a relish to many kinds of food that would otherwise be insipid. When food is not relished it does not digest as well. The excellence of soups depends upon the proper mixture of a number of flavors.

It is needless to say that food should be prepared with the utmost regard for cleanliness, and that all food should be free from impurities. Tainted meats and half-decayed fruits and vegetables are certainly not wholesome. Potatoes when too young, are watery and unwholesome. The flesh of animals which have been driven and overheated just before being slaughtered, is not fit for food. Pork often contains animal parasites which cause serious

disturbances in the body. The so called "measley pork" contains the undeveloped stage of the animal which is known as the *tape-worm*. The terrible *trichinæ* are parasites which often infest pork. These animals being set free in the human stomach, make their way in countless numbers to the muscles, and produce a fever which is often fatal. Thorough cooking destroys these parasites.

A cheerful state of mind is favorable to digestion. Digestion is often entirely arrested by powerful emotions of grief, anger, or fear. The general condition of the body affects to a greater or less extent the digestive organs, there being a mutual sympathy between all parts of the system. Pure air, proper exercise, proper temperature, proper condition of the skin, are all conducive to proper digestion and assimilation of food.

WATER.

Water is the best drink for man. This is proven by the fact that we can live but a few days without it, and we never tire of it. We should drink plenty of water. It is the conveyer of the soluble material which builds up the body as well as the conveyor of the waste material out of the body. One use of salt is, perhaps, to excite a desire for water.

The practice of drinking water or other liquids at meals is generally condemned by writers, but I think a moderate quantity of water cannot be injurious. It is true it dilutes the gastric juice, and lowers the temperature of the stomach when taken cold, but the stomach soon regains its temperature, and the water is rapidly absorbed. It carries with it during absorption a part of the soluble constituents of the food into the blood, and thus aids in the digestive process.

Water should be free from poisonous impurities. Perfectly pure water is always unpalatable. Certain mineral constituents seem to be necessary to make it palatable, and these impurities are usually harmless. But there are often dangerous impurities in water. These are usually *organic* matters, germs of disease or substances which will cause irritation and produce disease. There is little doubt that typhoid fever is conveyed through the medium of water. Many cases are on record of its being communicated by the drainage from vaults in which were deposited the excrements of typhoid patients, this drainage contaminating the water of wells, or cisterns. All such excreta should be burned or rendered neutral by chemical disinfectants.

Grave-yards are often the cause of contamination of the water supply. This has been used as an argument for cremation, and it is really a strong one. Nearly all of the dangerous impurities of water may be removed by filtering through powdered charcoal.

The practice of drinking milk at meals is not to be condemned in the case of those persons with whom it does not seem to disagree. The same may be said of other drinks which contain no narcotic or stimulating properties. Tea, coffee, wine, etc., will be noticed under the head of stimulants and narcotics.

MENTAL STATES.

The mind has a wonderful influence over the bodily functions, and on the other hand the condition of the body affects the mind. This mental reaction and sympathy is not only an argument for taking care of the body but teaches us that in order to have perfect health of body we should have the surroundings such as conduce to harmonious action of the mental faculties. Thus dyspepsia and

other disorders of digestion may be brought on by despondency of mind, and on the other hand these diseases may be produced by other causes, and themselves produce despondency of mind. The mind and body have a reciprocal action.

Powerful passions and emotions overwork the nervous system, which thus in a measure loses its control of the vital function of nutrition and there is a failure to produce good blood, and in consequence the nervous system itself is further weakened, being deprived of its proper nutriment. The blood is not only thus impoverished by failure of the nutritive apparatus, but is actually poisoned by retention of the excretions. We all know how powerful paroxysms of grief, fear, or anger disturb circulation and respiration, secretion and excretion. Such disturbances frequently repeated and long continued, can not fail seriously to impair the general health. Loss of friends, disappointments of various kinds, failures in business, accidents, misunderstandings and disagreements, may occur in the life of every individual. We should endeavor to cultivate a buoyant spirit, which will react against such contingencies. Many give way to emotions which an effort of the will would have checked. The will may be cultivated in this respect. I do not mean that one should suppress, in all cases, the tendency to expression of emotion and passion. Tears and words are often safety valves which relieve the tension of the nervous system. But it is the brooding over disappointments, and the trying to stir up grief and keep alive the spirit of resentment, against which I protest. To govern then, our passions, to control our emotions, to cultivate our will, reasoning power and judgment, is simply to obey one of the laws of hygiene.

STIMULANTS AND NARCOTICS.

By stimulants we mean those agents which excite or increase temporarily the vital forces. Narcotics are those agents which paralyze or stupefy to a greater or less extent the nervous system or some portion of it. Narcotics when given in small doses, are stimulating. This is the general law, but the effects are modified by age, sex, temperament and condition of health, and what may merely stimulate one person may narcotize another.

As stated by Dr. George M. Beard, the signs of stimulation are: "Relief of fatigue, irritation and pain; equalization of the circulation; improvement in sleep and in nutrition, and increased capacity for manual toil." And the signs of narcotism are: "In the first stage, flushing of the face, dilatation of the pupil, mental disturbance of various kinds, as evinced by the exhibition of garrulity, etc., nausea, tremor, spasms, convulsions, and other evidences of lack of co-ordination; in the last stages delirium, stupor, stertorous breathing (snoring), and death."

In a state of health stimulants are not needed. Much less are narcotics necessary in a state of health. They are, indeed, used far too frequently in treatment of disease. At one time I took the position that narcotics should never under any circumstances be used, but I found by experience that this position was untenable, besides I was going against the combined wisdom of the best authorities upon medical subjects. All good authorities in medicine condemn their excessive use in disease, and few, if any, favor their use in a state of health.

Let it be understood first that all narcotics and perhaps most stimulants are poisons. But poison is rather a relative term. The poison that will kill one animal will not kill another, Yet it is certainly true that a continued

use of an active stimulant other than food and the hygienic measures before mentioned, cannot fail to injure the system in the end. Experience teaches us that the agent which will stimulate a person to-day will, if its use be continued from day to day, fail in time to produce the same effect, unless given in larger quantities. Thus every stimulant makes one more or less a slave to itself. This is demonstrated every day by the toper, the tobacco user, the opium eater, and the one who uses an excess of tea or coffee.

Except on very rare occasions I see no good reason for the indulgence even in the smallest amount, of alcoholic drinks. Alcohol is a powerful stimulant and narcotic, and though useful in many cases in disease and on rare occasions of great bodily fatigue, want of food, or excessive mental effort, in restoring the exhausted energies of the system, yet its use is always attended with the danger of forming a habit which may prove ruinous. Many a man has ruined his bodily health, his reputation and his mind by giving way to the supposed demand of his system for a powerful stimulant.

The best stimulant generally after one is exhausted by fatigue is rest and food, and the best preparation for a period of great and exhausting effort is food and a proper alternation of exercise and rest, to place the body in the best possible condition for enduring extremes.

Alcohol prevents waste of tissue. In this sense it may be considered a food, but as waste seems to be the natural consequent upon supply and nutrition, it would seem to be an unnatural way of sustaining life. We live by constantly dying. That agent which prevents the natural waste or change of tissue certainly interferes with the normal course of affairs. I would say, then, so long as you are reasonably well and are obeying the hygienic laws already

discussed, you have no use for, and are better off without alcoholic drinks of any kind. But if you have undertaken or are about to undertake some very great and exhaustive physical or mental feat, or are to be exposed to great extremes of heat or cold which would depress the vital energies, then a small amount of alcohol will so add to your vital energies, that on the whole you may call it beneficial. But you must remember that if you take too much it goes beyond a mere stimulation and produces a depressing narcotism, and that you cannot always judge with any degree of accuracy the proper amount, as constitutions differ so widely in their power of tolerating the agent. Besides, you run the risk of forming an alcoholic habit which you may find impossible to throw off.

I need not here enumerate the evils of the use of alcoholic drinks. The testimony is overwhelmingly against the habitual or even occasional use of alcoholic stimulants in a state of health. I will only state a fact well known to medical men, but, perhaps, not so much thought of by others, and that is that the daily use of small quantities of ardent spirits kept up for a number of years produces disease much more surely than the habit of becoming occasionally intoxicated. It is the so called *temperate* drinkers who suffer from diseased livers and from diseases of the digestive and nervous systems, and not the man who becomes dead drunk two or three times a year.

TEA AND COFFEE.

Tea and coffee are mild stimulants. Whether they are injurious or not, depends much upon the peculiarities of the individuals. Some persons can drink them temperately and seem benefited, while upon others the habit grows and they drink much larger quantities, and suffer

headache or other inconveniences when they are obliged to eat a meal without them. Such persons are slaves to these beverages, and should break off the habit.

Dr. George M. Beard says, "Coffee is a natural product of warm climates, and is better adapted to the inhabitants of those regions than tea; but in cold and temperate countries, coffee, for some reason which we do not understand, is very frequently injurious." This will account for the fact, probably, that the people of southern countries are great users of coffee and those of northern are greater lovers of tea. Thus in the Southern States of our Union, France, Italy, Turkey, Spain, and in South America coffee is the great drink, while in Russia, in England and in the Northern States, tea is more largely used.

Warm drinks at meals do not retard digestion by lowering the temperature, and for this reason tea, coffee or chocolate may be better than cold water. But they should not be made too strong.

There is no doubt that many persons, especially those of a nervous temperament, are injured by them, and would be better off had they never formed the habit while young. If a warm drink at meals is desired, hot water with cream and sugar makes a very pleasant substitute for tea or coffee.

This peculiarity of tolerance of certain articles is not confined to stimulants and narcotics. Certain kinds of food cannot be eaten by some persons, producing convulsions or nausea even when taken in the smallest quantities. Each one then should study himself and find out by trial and careful observation whether these mild stimulants are useful or injurious to him, remembering always that though they *are* mild yet when used in great excess they become narcotic. The active principles of tea and coffee, namely *caffeine* and *theine*, are virulent narcotic poisons.

When we drink these beverages, of course we get only very small quantities of these principles.

TOBACCO.

Little can be said in favor of the use of tobacco. There seems to be no real demand for such a stimulant, although there are many who are apparently not injured by it. The habit is offensive in every case and thousands are no doubt greatly injured by even a moderate use of the weed. Numerous diseases may be traced to their source in the excessive use of tobacco. Many of the functional or sympathetic affections of the heart are caused by its excessive use. There is what is called the "smoker's heart," a condition of palpitation or functional disturbance caused by the action of the nervous system brought about by the use of tobacco.

Young man, if you have already become a slave to this habit, free yourself by one firm resolve to "touch not, taste not, handle not." It may cause a temporary disturbance of the system to break off the use of any stimulant suddenly, but this need not cause any alarm. The system will soon regain its wonted tone and you will have satisfaction in that you are free from a galling slavery.

The opium habit, though existing to some extent in this country, will never, perhaps, become a national vice. I need not say anything against its use. It is a slavery more to be dreaded than that of any other narcotic. While it does not seem to shorten life, its effects upon the nervous system are such as to make life miserable.

In general it may be said that when one tampers with stimulants and narcotics he is in the position of a person driving a team of blooded horses. He must keep a tight-rein, and a sharp look out, or he will be at their mercy.

CHAPTER III.

ACCIDENTS AND EMERGENCIES.

It is a true, though time-worn saying, that "accidents will happen in the best regulated families." Two small volumes lie before me, which contain much valuable knowledge, and from them I have taken many ideas for the substance of this chapter. The largest of these books is entitled, "Till the Doctor Comes and How to Help Him," by George H. Hope, M. D., M. R. C. S. E. The other is a minute pamphlet compiled by Burt G. Wilder, M. D., and entitled "Emergencies and How to Meet Them."

PAIN.

There is a wonderful difference among people in respect to the power of enduring pain. Sometimes the strongest and roughest men are like babies in this respect, while there are delicate women who will endure the most excruciating pangs without a murmur. It is much a matter of education—education in two ways. First, frequent recurrence of pain accustoms one to it and he learns to bear it with patience; secondly, by an effort of the will which may be cultivated, one may not only suppress to a great degree the inclination to cry out at pain, but do much toward relieving its severity. The child cries out at the least twinge of pain, and the tears flow on slight provocation, but the man does not care for a little pain, and the severest pangs are rarely attended with tears.

The man has become accustomed to slight pains, and has more will power. Persons who have been sick a great deal complain less when suffering than those who have suffered little in their lives. Women as a rule are called upon to endure more pain than men, and they usually bear it with more fortitude.

Pain is not given to us as an evil but for our good. We would take no care of ourselves if it were not for pain. Nature warns by a pang when we violate her laws. Pain itself never kills, though the cause of it may. It is true, it may be indirectly the cause of death by preventing sleep, and causing an irritation of the entire nervous system. It must be remembered that the degree of the pain is often not proportionate to the extent of the injury, or severity of the disease. Extensive wounds and fatal diseases are often attended with but little pain, while very simple disorders and slight injuries are accompanied by very severe pain.

While experience and will power will in great measure lessen pain and enable one to endure it without complaint, yet it is not always best to suppress the outcry or the tears. As stated in another place, these are safety valves which relieve the tension of the nervous system. Persons may make themselves worse often by suppressing an inclination to cry out, or to shed tears. This applies to bodily as well as to mental suffering. If the pain is very great, then give way to these expressions of it, but if only moderate, exercise your will power, or divert your mind into some interesting channel of thought. It is well known that pain may be relieved by mental diversion. The child often forgets its pain when some new attractive object is brought before it. The sight of a dentist often relieves the toothache, as thousands can testify. The fear of greater pain to follow relieves the present suffering

because it diverts the mind and for the time a mental emotion has the upper hand of a mere physical sensation. These emotions, to be beneficial to the nervous system, however, should not be frightful but pleasurable. The pain of an aching tooth would not injure the nervous system as much as the fright caused by the thought of the pain to be produced in extracting it. Florence Nightingale and women of her class, have carried relief to thousands of hospital sufferers by their mere presence and soothing words.

Let us remember this when we visit the sick. We can do much toward relieving their sufferings by a cheerful demeanor and often by encouraging words or a touch of the hand. The doctor who uses such means of relieving pain in addition to his medical agents is the most successful.

PRESENCE OF MIND.

In all cases of accident and in every trying emergency that person who keeps his presence of mind and takes things coolly and deliberately, will be of most benefit to the suffering ones. Remember that screaming, rushing wildly around and expressing horror or pity will not do any good but only tend to excite the sufferer or those attendants who are trying to be calm and render assistance. Physicians are compelled to cultivate the art of controlling their feelings. They are sometimes accused of being hard-hearted and in some instances perhaps they are, but in general it is because they have their minds under good control. Says Dr. Hope: "Of all the miserable hindering nuisances, there is none worse than persons who, just at the time when their services are most required, begin to scream, run wildly about, put themselves in every one's way, hinder other people, are not able to give a sensible

answer, perhaps faint, or go into hysterics, or pretend to do so."

WOUNDS AND BLEEDING.

Do not be frightened at the sight of a wound, at least until you have examined it carefully. A very slight scratch may bleed profusely and make it appear of frightful severity. First notice the *color* of the blood and the manner in which it flows. If it be dark and flow steadily, veins only are injured and the danger of serious bleeding is usually slight, but if the blood be of a bright scarlet color and flows by *spurts*, there is one or more arteries wounded, and the danger of severe bleeding may be great. In the first case you can generally manage yourself but in the second case if you cannot stop the bleeding in a few minutes by pressure or applying substances to the wounds, send for a physician at once. But in the meantime do not be idle. Keep trying to prevent the bleeding. If the wound be in a limb and the blood spurts from a single



FIG. 268.—Handkerchief and Stick.

point, a main artery has been wounded and the remedy is to apply pressure on the vessel *above the point of injury*, or on the

side nearest the heart. This you can do by tying a handkerchief loosely around the limb, passing a stick through the loop and twisting round and round until you have made considerable pressure. Place the limb in such a position that the blood may flow more freely back toward the heart. Small arteries may be wounded, or there may be considerable bleeding from small veins. In this case there are many substances which when applied to the wound directly will tend to close the open mouths of the blood-vessels. Lint scraped from a towel, cotton, cob-

webs, or any similar substance, may be used. Alum is often at hand. A little pulverized and put into the wound will be good. But if nothing else be at hand, take some dry earth and hold on the wound. This has saved many a life on the battlefield.

Sometimes in the case of a rather large artery it will be best to place a cork or any solid substance into the wound, push it down, and hold it there by a bandage. I had once a case like this: A boy knocked a lamp from the table, and attempting to save it he received a severe wound by the broken glass in the center of the palm of the hand. The blood was flowing quite freely in jets. I applied the



FIG. 269.—Rag Compress.

bandage around the wrist hoping to compress the main arteries of the arm, but without success. The position of the arteries with

reference to the bones were such that I could not reach them with the pressure. Then I took a cork, pushed it down in the wound and tying a bandage tightly over it, succeeded in arresting the flow.

Large veins sometimes are injured. Then the bandage must of course be placed *below the wound*, or on the side farthest from the heart. If no bandage, not even a handkerchief be at hand, try to compress the vessel with the thumbs if you know where it is located. If not, try grasping the limb tightly in both hands.

The bleeding from slight wounds may often be arrested by plunging the part in cold water, or by bandaging tightly while the blood is flowing. Never put warm, or lukewarm water on a wound while it is bleeding. A quantity of court plaster ought to be kept in every house to be used in closing slight wounds. A wound heals much more readily when the parts are nicely brought together.

But in case of injuries made by broken glass, splinters of wood or the like, it is not best to close the parts, as there may be particles of foreign matter remaining in the wound. Such wounds should be carefully washed and examined.

Slight wounds about the head and face are apt to bleed freely, but are rarely dangerous. If a fish hook gets into the flesh, do not attempt to pull it out the way it went in, but push it on through, if necessary breaking off the head.

It is important to know when blood comes through the mouth whether it be from the *lungs* or *stomach*.

If from the latter organ it will be of a dark color and may be mixed with the food. If from the lungs it will be brighter in color, and frothy. When from the lungs it is usually a serious symptom. In either case give a little vinegar or lemon juice, and a very little cold water or bits of ice, and consult a physician.

There are some persons who seem to have a peculiar tendency to bleed from the slightest causes. In such cases the extraction of a tooth is often attended by serious hemorrhage. Persons knowing themselves to have such tendency should tell the dentist, that he may be prepared to stop the bleeding.

It is common for some persons to bleed freely from the nose, and sometimes it is quite difficult to check it. Bathing the neck and face in cold water, holding the arms above the head and pouring solution of alum into the nostrils, will usually succeed. If these means fail send for a doctor.

Every one ought to learn the location of the larger arteries which come near the surface. They may be felt pulsating in the following places: (1) At the wrist next the thumb; (2) on each side of the neck in front: (3)

upon the temples; (4) upon the lower jaw half way between the chin and the ear; (5) by grasping the corner of the upper lip between the thumb and fingers; (6) same with the lower lip; (7) in the arm pits; (8) at the bend of the elbow; (9) behind the knee; (10) upon the thigh just below the groin. (This is a very large artery but it may be compressed by placing the thumbs upon it and throwing the weight of the body upon the thumbs. This may sometimes save a life as it can be held, checking if not stopping entirely the flow of blood to the limb until surgical aid arrives.)

BURNS AND SCALDS.

The first thing necessary in the treatment of a burn or scald is to exclude the air, for air is irritating to any part where it does not come naturally. In burns the epidermis is destroyed and the sensitive parts are exposed to the air. Water excludes air and is soothing to raw surfaces so that it is never out of place. Wet applications then, are the first requisites. Oils which are not stimulating are also good, and may follow the application of water. Linseed oil is one of the best for this purpose. Cloths saturated with linseed oil and limewater are recommended by good authorities.

If a burn is extensive and severe better send for a doctor. When the surface injured is very great, death often results sooner or later from shock. In such cases there is very little if any pain, and persons may be deceived into the belief that the injury is slight.

The question of how to avoid accidents from fire, burning oils, etc., is really of more importance than the treatment of the injuries.

Teach children to be careful of fire. Take no light or fire near vessels containing kerosene, gasoline, or other

inflammable oils. Keep lamps well filled, and never fill when lighted, nor within a yard of a light. Never pour oil on a fire. If you do use oil for kindling fire first put the oil on the fuel, using very small quantities, and then after taking the vessel to a safe distance apply the match and do not stand over it.

Inflammable or explosive oils are not of themselves inflammable nor explosive but are highly *volatile*, that is, they produce a gas or vapor at low temperatures, and this vapor will burn quietly when pure, but when mixed with air explodes violently. When a lamp or a vessel is partly filled with oil the air in the upper part becomes mixed with this gas, and if a light be applied there will be an explosion. Remember also, that the gas is very light, and always rises. Oil appears to burn when it is spread over a surface, but in reality it does not. The heat first applied vaporizes a portion, and the gas burns and the heat of this vaporizes more, and so on. Throwing water then on oil will not extinguish it, but causes the oil to spread and expose more surface to the heat.

Vapor, or *gasoline* stoves are coming much into use. Many persons are afraid to use them. Would they observe these simple rules there would be no more danger than in burning wood or coal. The stoves are so made that only a small portion of oil can escape at a time, and this striking a heated iron plate is immediately vaporized and burned, and thus no more gas is manufactured than is immediately used. But the danger consists solely in filling the reservoir while the stove is burning, or in bringing fire near the vessel containing the oil.

Ether, chloroform, alcohol, spirits of camphor, turpentine, benzine, sunlight oil and many other oils and liquids are more or less volatile, and their vapors form with air explosive mixtures. Place no confidence in men who sell

what they pretend to be non-explosive oils. The safest oil is that which requires the highest temperature to vaporize it, but all oils that are used for illumination are dangerous when improperly handled.

The question what to do when fire breaks out is important. First of all, keep cool, don't get excited. Go to work to put out the fire and call for help at the same time, but while you work rapidly *think* what you are doing. If your clothes are on fire don't run about, but lie down and try to smother the flames, or seize the first cloth or garment, bedquilt, table cover, carpet, or anything of the kind, and proceed to wrap the body in it. If oil is spilled over a wooden surface and the vapor gets on fire it will often burn off without igniting the wood, at least the oil will be mostly consumed before the wood takes fire. The fire will be more easily extinguished after it has burned a little while than at first.

If obliged to pass through fire or smoke wet a cloth and put it over the face and head. Take a full breath first and stoop low. Handle phosphorus with wet fingers or under water, but do not touch sodium or potassium with moistened fingers.

FRACTURES, DISLOCATIONS AND SPRAINS.

A broken bone renders the person unable to raise the limb, is attended with great pain, and the limb may be bent where it ought not to bend. The bones of a child, however, may be partly bent and partly broken, making a permanent crook in the limb. Place the patient in as easy a position as possible, apply a wet cloth to the part, and send for a physician.

Dislocated bones may sometimes be replaced without sending for a physician, but one should be sure it is a dislocation and not a fracture, before he begins to pull a limb.

The lower jaw is sometimes thrown out of place. One cannot mistake such a case as the mouth is held wide open and the person cannot speak. Place the thumbs wrapped with a cloth far back upon the grinder teeth of the lower jaw, and press downward and backward.

Sprains are often more serious than fractures or dislocations. Keep the parts quiet and apply warm, moist applications. There are many kinds of poultices used by people, but their efficiency depends altogether upon warmth and moisture.

DROWNING.

The ability to swim is a very desirable accomplishment. Every boy should learn it. The reason man cannot swim naturally is said to be because he loses his presence of mind and tries to keep at the top of the water. The animal makes the same motions in the water that it does on land—in other words, treads water. If one would not get frightened but try to keep the nose and mouth only out of water and make motions with the limbs like an animal he would not sink, for the human body is a very little lighter than water. Any articles upon the body which of themselves would sink in water will tend to drag the body down, and on the contrary any articles attached to the body which would of themselves float, will tend to aid one in floating.

Do not bathe alone in deep water unless you are a good swimmer. Even then it is dangerous, as one may be seized with cramping. Inspire quickly and expire slowly when in the water.

Persons who have been apparently drowned have been restored by patient working, even when all signs of life seemed to be extinct. The English Life Boat Association issued a circular containing directions for restoring to

life the apparently drowned. The following is the substance of the circular :

As soon as the person is taken from the water remove all clothing from the face, neck and chest, and proceed at once to attempt to restore breathing, and excite warmth. First place the patient on the face with one arm under his forehead. In this position the tongue will fall forward, and the water will escape more freely. If breathing begins use the means described below. to promote warmth.



FIG. 270.—Resuscitating the Drowned.

If there be but slight breathing or none turn the patient on the side as in fig. 270, support the head and tickle the throat and nostrils with a feather, at the same time rubbing the face and chest, and dash water on them. If no success, proceed at once to *imitate breathing* by replacing the patient on the face, supporting the chest on a folded coat or something of the kind, then turn the body gently on the side and a little beyond, then back again, repeating this process several times a minute, occasionally varying the side. Every time the body is placed upon the face make gentle pressure between the shoulder blades. While this process of turning the body is going on others may

be rubbing the feet and limbs with dry cloths to restore warmth. After continuing this turning process for five minutes with no result, proceed as follows.



FIG. 271.—Resuscitating the Drowned.

Place the body on the back, supporting the head and shoulders on a cushion made by folding an article of clothing. Draw forward the tongue and cleanse the mouth



FIG. 272.—Resuscitating the Drowned.

and nostrils. The tongue may be secured forward by an elastic band or string tied under the chin. Stand at the

patient's head, grasp the arms just above the elbows and draw them gently upward above the head and keep them there for about two seconds. This draws air into the lungs. (See fig. 271.) Then turn down the patient's arms and press them firmly and gently against the sides of the chest. This presses the air out of the lungs. (See fig. 272.) "Repeat these measures alternately, deliberately and perseveringly, fifteen times in a minute, until a spontaneous effort to breathe is perceived, immediately upon which cease to imitate the motions of breathing, and proceed to induce circulation and warmth." This is to be accomplished by the application of hot flannels, etc., over the stomach, between the thighs and to the soles of the feet, by vigorous rubbing and by the administration of stimulants, as a little wine, brandy, or strong coffee. One should not be discouraged if no apparent good were accomplished by *three or four hours* of such work. Cases are on record of recovery after *six hours* of suspended animation.

FREEZING.

A sudden change from extreme cold to heat is injurious. When a person is benumbed with cold do not take him to a warm room at once, but wrap him up in blankets, remove clothes if wet, and rub the skin thoroughly, especially the extremities, and give a little warm coffee, tea, or weakened wine. Make him move about if possible, if not work the limbs so as to rouse the circulation. Then take to a room not too warm, continue the rubbing and exercise.

Persons are often frost-bitten before they are aware of it. The extremities, as the hands, feet, nose and ears are thus attacked. Do not bring the parts near the fire, but *rub with snow*, or apply cold water with vigorous rubbing, then apply sweet oil or lard, and wrap in flannel. If the

parts are frozen *stiff* injury will result from careless handling or hard rubbing. Immerse in snow or cold water.

A man may creep into a snowbank and keep from freezing provided he does not allow himself to go to sleep. The feeling of drowsiness should be resisted by exercise and will power, for to sleep under such circumstances is to die. It is extremely difficult to overcome this drowsiness, and death by freezing is painless at the last.

POISONS AND POISONING.

When persons have swallowed poison, there is no time to be lost, and though you should send at once for a doctor there is much you can do before he can possibly arrive.

As a general rule, the person should be made to vomit immediately. The best emetic in such cases is a teaspoonful of powdered mustard in half a pint of warm water. Salt and warm water is also good, or alum and water, or if nothing else be at hand, have the patient drink copiously of warm water. Pushing the finger down the throat as far as possible will generally cause vomiting but in this case plenty of water should be taken previously, as the stomach can retch more easily when full than when empty. You cannot swallow too much water provided it is vomited up and a persistence in drinking and tickling the throat, will bring this about.

Many poisons have special chemical antidotes which neutralize their effects, but there are others which cannot be thus neutralized. In such cases some oily or mucilaginous substance may be given. Oil or grease of any kind, cream, milk, or white of egg may be used, the latter being the best. Vomiting and the use of oily and mucilaginous substances then, may be considered as general treatment for every kind of poison.

KINDS OF POISONS.

I shall mention some of the more common poisons and their antidotes.

Arsenic.—Paris green, ratsbane, white arsenic, etc. Vomiting. Give milk and raw egg, or limewater, or flour and water.

Alkalies.—A class of substances characterized by an acrid or *bitterish* taste, a *soapy* feel, and chemically opposed to acids. The common poisons; among them are concentrated lye, potash, sal soda, and ammonia or hartshorn. The antidotes are always acids, but as many of the acids themselves are poisonous, only certain ones can be used. Vinegar, lemon juice and sour cider are about the only available harmless acids. These may be used freely.

Acids.—A class of substances characterized by a *sour* taste, and chemically opposed to alkalies. The common dangerous acids are sulphuric, or oil of vitriol; nitric, or aqua fortis; hydrochloric, or muriatic; acetic; oxalic. The antidotes are the harmless alkalies, as powdered chalk, magnesia, soap, limewater. If nothing else be at hand scrape the plastered wall, put the scrapings in water, and swallow the mixture.

Antimony.—Tartar emetic. Give plenty of strong tea or tea of oak bark, elm bark, currant or blackberry leaves.

Carbolic Acid and Creosote.—Differing somewhat from the common acids. Give sweet oil, or castor oil, and a mixture of lime, sugar and water.

Chloroform, Ether, and Chloral.—Generally injured by inhaling the two first. Dash cold water in face, suspend patient by the legs for a few moments. Artificial respiration, as for drowning.

Copper.—Blue vitriol, or blue stone; verdigris, food

cooked in copper vessels ; "greened pickles." Give milk and white of eggs, and strong tea. Do not give acids.

Iron.—Sulphate of iron ; copperas, or green vitriol. Give magnesia, or carbonate of soda and water.

Lead.—Acetate of lead, or sugar of lead ; red lead, or red paint ; white lead, or white paint. Give Epsom salts, two ounces in a pint of water, and a wine glass full every ten minutes until it operates freely. Painters and others who work with these substances are often slowly poisoned, causing what is called lead colic, attended with loss of power of limbs, noticeable in the wrists. Send for physician.

Mercury.—Calomel ; corrosive sublimate, or bed-bug poison ; red precipitate ; vermilion ; blue mass or blue pill, etc. Give white of eggs freely, or flour and water, or milk, or linseed oil.

Opium.—Laudanum, or tincture of opium ; paregoric ; Bateman's drops ; soothing syrup ; poppy seeds ; morphine, etc. After inducing vomiting, give plenty of strong coffee, put mustard plasters on calves of legs, keep the patient roused by dashing cold water in face, and beating soles of feet.

Phosphorus.—Matches, rat poison, etc. Give magnesia, chalk or whiting with warm water. Give no oil or fat of any kind.

Prussic Acid and Cyanide of Potassium.—Very powerful poisons. Teaspoonful of hartshorn in pint of water, dash water in face, give stimulants.

Silver.—Nitrate of silver, or lunar caustic. Give salt water freely, then castor oil and flaxseed tea.

Saltpeter.—Give flour and water, or linseed oil.

Strychnine.—Rat poison ; nux vomica ; dog button. Convulsions are produced, and the body bent backward. After an emetic, give flaxseed tea. Keep quiet and darken

the room. Give belladonna or opium under medical advice.

Zinc.—Chloride of zinc; white vitriol, or sulphate of zinc; oxide of zinc. Give milk, magnesia, or chalk and raw eggs.

Keep all poisonous articles plainly labeled, and out of the reach of children.

ASPHYXIATION.

Persons suffocated by foul air require treatment similar to that required in restoring persons apparently drowned. Before one enters a well, cistern, or sewer, he should let down a lighted candle. If the candle does not burn, life is not safe in that atmosphere. Charcoal should never be burned in a room outside of a stove or fireplace. Occasionally we find a person who knows no better than to blow out the gas instead of turning it out. It is not good to turn down a coal-oil lamp and let it burn all night in a sleeping apartment. If illuminating gas has by accident escaped into a room remember that mixed with air it is dangerously explosive. Do not bring a light until the room is thoroughly aired.

BITES OF SNAKES AND DOGS.

If bitten by a rattlesnake or other venomous snake, suck the wound if the mouth is not sore. Give plenty of alcohol and water, or whiskey. Cauterizing the wound with a hot iron or caustic may be practiced also.

For the bite of a mad dog apply the same remedies, except the use of the spirits. The dog should not be killed if he can be secured with safety, because he may not really have been mad, and no one knowing otherwise, the fear of hydrophobia, even when there is no danger, may so affect the patient as to prove serious.

CHAPTER IV.

THE SICK ROOM AND NURSING, ETC.

The sick person needs the pleasantest room in the house, as a rule, yet in cases of some fevers, brain troubles, and the like, a quiet room with not much light is to be preferred before other considerations. A room with a fire-place is usually preferable. In infectious diseases the room should have but little furniture, especially woollen articles and cushions, as such things absorb effluvia. Flowers, pictures, etc., are never out of place.

It is a common saying that good nursing is half the battle against disease. All physicians realize the importance of good nursing, and often they are blamed for unsuccessful treatment when the fault lay entirely with the nursing. It is astonishing how dishonest, careless, cruel, slovenly and ignorant some persons are in a sick room. The physician often is obliged to combat the disease and the attendants at the same time. They neglect to give his medicines through carelessness, or presume to substitute their own knowledge for his, wilfully refusing to give them and then lie to him about it when he comes, or they give some patent medicine or old wives' remedies of their own, instead of the doctor's prescriptions. They neglect to attend to ventilation, bathing, and cleanliness; give the patient food when it is forbidden by the doctor, handle the patient roughly, and use rough language in his presence, or fill the room with all sorts of unpleasant gossip.

While the doctor's orders should be carried out as a rule to the letter, yet the nurse should use common sense and remember that the doctor cannot foresee every change that may take place, and that there will be occasions where it will be necessary to depart from his directions. The good physician will tell the nurse of contingencies that may arise, and which will change the order of his directions, yet even the best physician may not think of everything, and the common sense of the nurse must be the guide in such cases. The sensible nurse will ask the doctor what she must do in case such a contingency arises, and when the case is an extreme one, and she cannot decide what ought to be done, she will send for the doctor, or send him a statement of the case.

I have used the feminine pronoun here as though women were the only good nurses. As a rule they are best adapted for this work. The superior strength of a man is often necessary in lifting patients and attending to matters in cases of emergency. An affectionate husband will usually make a better nurse for his wife than any woman would.

Dr. Hope says: "There are five qualifications which we require in a nurse—Sobriety, Cleanliness, Firmness, Gentleness and Patience," and I would add common sense and some general knowledge of physiology, hygiene and medicine. The nurse and physician must act in unison.

Never whisper in a sick room. If you have anything to say, say it in your natural tone of voice, or not at all. While it is generally necessary to be quiet and not make unnecessary noise, you can be too quiet. Remember that when a person is sleeping, it is not always the loud noise that awakens him but the unusual noises. A person may walk slyly up to the bedside of a sick man asleep, and stand perfectly still; the patient may wake, and seeing him

there without any warning of his approach, be terribly frightened.

Be cheerful. It is time enough to look sad and cry after the patient is dead. There is a difference between a look of sympathy and a look of sadness. The former expression often benefits the sick person, but the latter always does harm. I mean no irreverence nor ridicule when I say, wait until the patient is dead, to cry. I mean that it is your duty to do all you can to cheer up the patient and turn the scale toward health.

The nurse should consider herself privileged to make suggestions to the doctor, or ask his opinion on any question. If she does it in a proper spirit no doctor will take offense, and as they say, "Two heads are better than one," much good may often result from such consultations. But never ask the doctor's opinion, and then act in opposition to it.

You cannot be too careful in giving medicines according to directions, especially where you are required to measure out the dose. Better in bad cases request the physician to write down his directions in full. You can be too particular as to the time of giving medicines. Sometimes the patient is sleeping soundly and it will not be best to waken him for the medicine. Do not give it either the moment he wakes, nor when he wishes to be moved, nor interrupt him with the medicine when he is about to make a request. As a rule, patients should not be waked up to take medicine.

One of the greatest faults the friends of the sick have is the habit of continually asking the patient if he wants something to eat. As a rule, sick persons are fed too much. Ask the doctor's advice about the food, and follow his directions. Do not urge food upon sick persons unless in extreme cases. Think of Dr. Tanner living forty days

without a morsel of food. When one is lying inactive, but little food is really required. Give plenty of water, however. Water is essential to changes which take place in the system for repair. But caution is necessary, even here, for sometimes a feverish condition of the internal organs calls so loudly for cold water that more may be given than necessary, and result in excessive diarrhœa, or other difficulty. Better give oftener and not so much at a time, or sometimes substitute warm drinks, or some agreeable acid drink, as lemonade, vinegar and water, juices of fruits, etc. Acid drinks are rarely out of place, and generally agreeable to the patient. If you desire patients to take only a small quantity of drink at one time put no more in the drinking vessel than you want them to have, and let them drink all of it.

Every family should keep a "medicine chest." Now I do not mean that they should have a small drugstore, or anything of the kind. Put in this chest, which should be kept locked, a number of articles which may be useful in case of accidents or sudden sickness. A pair of scissors, paper of pins, several needles threaded, a ball of wrapping twine, a spool of thread, a roll of old muslin or calico, some old linen and flannel, some court plaster, a little lint scraped from a linen towel, a bottle of castor oil, and another of sweet oil, one of linseed oil and one of turpentine, a little alcohol or good wine, a bottle of tincture of ginger (valuable in colic, cramping in the stomach, and as a quick stimulant), some Epsom salts, carbonate of sodium, a bottle of limewater (made by simply putting a few lumps of quicklime in water and after it has ceased working and settled, the clear water poured off), a little ground mustard, but it is apt to lose its strength, some common salt, some good cider-vinegar, a lump of alum, and a bottle of syrup of ipecac, or syrup of lobelia. Do not use

laudanum, morphine, chloral, chloroform and such powerful narcotics without the advice of a physician.

APPROACH OF DISEASE.

There is a great difference among people with regard to sending for the physician. Some will send for him upon every slight indication of sickness, others will not send until the patient is dangerously ill. Do not be scared at every slight indisposition. As a general rule, if one is suddenly and apparently severely attacked, the trouble is either one which is beyond relief, or the danger is *only* apparent. Second, a knowledge of some of the symptoms and the general course of disease will often aid in deciding whether a case is really dangerous, or requires medical skill.

Again, some persons seem to think a doctor knows everything, can look as it were, through a patient, and tell at once all about the case. Others seem to think that not only does a doctor know everything, but can do almost anything, that his medicines have wonderful power to cure disease. I am sorry to say that even tolerably well-educated people often fall into these errors. The doctor is but a man like other men. His medicines only aid nature, and do not effect cures. This has been said hundreds of times by good authority, but yet people do not seem to realize it. Quack doctors have for ages thriven and will continue to thrive on this ignorance.

It should be remembered that disease comes in varied forms; its symptoms are often obscure, and the same disease affects different persons differently. Also that the onset of many diseases, especially fevers, is attended with similar symptoms, and that it is often impossible to tell at first what the difficulty is. A common cold may have all the symptoms of an approaching fever. The various eruptive diseases, as measles, scarlet fever, small-

pox, etc., have before the eruption appears many symptoms in common. When one complains of headache, aching through the body, chilliness, and the skin is hot and dry it may be only a cold, or it may be the approach of a continued fever. You must, then, do what would do no harm if it were fever, and do good if it is but a cold. In such cases the bowels are generally more or less constipated. A very mild physic will not be out of place. Put the person to bed after he has soaked the feet in hot water, and drank some hot drink of any kind. (Hot lemonade is an excellent drink.) If it be only a cold the next morning will be apt to show an improvement if not an entire remittance of the symptoms. If no better but rather worse, then send for a doctor.

One cannot be too cautious in giving physic. Even the mildest purgatives in some sensitive conditions of the bowels are apt to produce a troublesome diarrhœa or result in some way seriously. Give small doses of castor oil, Epsom salts, Rochelle salts, or cream of tartar, and if no action in four hours repeat the dose, slightly increasing it. Then if no action in four or five hours, use a syringe, injecting half a pint of warm water containing a little salt, or soapsuds.

Persons are often attacked rather suddenly with pains in the stomach and bowels, attended with vomiting and diarrhœa—cholera morbus, it is usually called. Apply cloths wrung out of hot water to the stomach, changing them frequently, or a poultice of hops. Give tincture of ginger, a half teaspoonful in a little water every ten minutes. If relief does not come in two hours, send for the doctor. Sick people are apt to be worse at night. Take this into consideration before becoming alarmed, and sending for the doctor.

CARE OF CHILDREN.

Children are often taken suddenly in the night with spasmodic croup. Something must be done immediately. The doctor is not always within easy call. Give a half teaspoonful of syrup of ipecac, or lobelia, and repeat every ten or fifteen minutes until vomiting is produced, or relief comes. Put the feet in hot water and apply a poultice of hops or bran to the throat. If these measures do not afford relief in an hour, send for the doctor. They will, however, generally bring relief.

Children often have convulsions (spasms or fits, are, perhaps, more common terms). These convulsions generally arise from teething, worms, or some indigestible food, or other irritating substance in the stomach and bowels. In such cases give a half teaspoonful of syrup of lobelia, or ipecac, and apply cloths dipped in turpentine or hot water and mustard to the legs, and cold water to the head. Generally the fit will pass off in a few moments. If not, keep up the syrup and the applications, and send for medical aid.

Children should be closely watched in regard to their breathing. There is a disease rather prevalent in this country, called by the doctors pseudo-membranous croup. Its approach is so insidious, the general disturbances of the system being so slight, that it may gain quite a hold before attention is called to the matter. Then it is generally too late, consequently the disease is alarmingly fatal. The first symptom is an increase of the rapidity of the breathing. The child may be playing as usual, and apparently well, but if observed closely the breathing will be seen to be more hurried, and perhaps a slight wheezing sound will be heard. Lose no time in sending for a physician, especially if there be no other cause for the hurried

breathing, as severe exercise, or fever, as shown by hot skin and flushed face.

INFECTIOUS DISEASES.

The words infectious and contagious are usually used synonymously, but this distinction is often recognized: A *contagious* disease is one which may be communicated from one person to another, either by actual contact, or by inhaling or absorbing the poisonous germs of the disease from the atmosphere, or from clothing, etc. An *infectious* disease is one which has some hidden or unknown cause which seems to originate from some locality, and spread among the people.

The term *epidemic*, which we so often see, is applied to any disease which may affect almost the entire population of a country at the same time. It may be contagious or not. Thus we speak of an epidemic of small-pox, or measles, when there are a great number of cases at one time in a section of country. These diseases are also contagious. We speak also of an epidemic of cholera which is not really contagious, but one may get it from the general condition of the atmosphere which causes it.

PREVENTIVES OF DISEASE.

It is a well-known fact that *fear of a disease* affects the nervous system, which, reacting upon the vital forces generally places the body in a condition favorable for taking the disease. This is only another instance of the influence the mind has over the body. It should be remembered that the forces of the system tend to resist the introduction of poisonous or destructive forces from without, and not only this but they tend to throw out poison when once introduced. The effects of these poisons and the effort nature makes to get rid of them, is the disease.

There is what is called the germ theory of disease, which, in fact, in the case of many diseases is not a theory but an established truth. According to this theory, many, especially the infectious, or contagious diseases are produced by the introduction into the blood of certain germs of animal or vegetable life which multiply and develop, run a certain course and die, throwing off, however, germs into the atmosphere which are the seed of new disease in some other individual. But what is singular, when these germs have developed once in an individual and passed through his blood, the latter is so modified that it will rarely ever receive the germs the second time. Thus small-pox, measles, etc., usually render the system incapable of taking the same disease the second time.

But there is another way of modifying the condition of the blood so as to make it invulnerable, or partially so, and that is by vaccination. It was discovered that if the virus, or poison, from the disease known as the cow-pox, were introduced into the human system it would produce a mild form of disease, and that this would protect the person from an attack of small-pox, or at least modify its virulence. It was further discovered that if a cow were inoculated with small-pox virus the animal would have the cow-pox, and that the virus produced on the cow could be used for vaccination.

It is still an unsettled question whether the power of vaccination will extend through a lifetime or run out in a few years. The notion that one ought to be vaccinated every seven years is not founded on scientific principles. To be on the safe side, however, one ought to be vaccinated at least as often as every seven years.

It is not safe to allow yourself to be vaccinated with virus from another person. There is no doubt that other diseases may be and often are communicated in this way.

Nothing but pure fresh virus from the cow should ever be used.

No physician doubts to-day the value of vaccination, but there lurks still a notion among people that it is of no value, and there is generally a great deal of carelessness on all hands in regard to this matter. Dr. Hope, a physician of great experience says: "I have never yet seen a person die, or lose sight, or be disfigured, who had been properly and successfully vaccinated."

While you should not be frightened and run away when small-pox or cholera breaks out in a neighborhood, you should not venture unnecessarily into close proximity to persons afflicted. If such diseases come into your house, see that patients are put in a room where there is but little furniture, keep everything scrupulously clean, and disinfect all articles which have been used about the sick person. Ask the doctor about the best method of disinfecting clothing, etc.

COLDS AND COUGHS.

A "cold" is a failure of the skin to perform its function of excretion, caused by the rapid lowering of the body temperature, the loss of heat not being followed by increased production. When the skin thus fails to perform its duty the poisonous materials are locked up in the blood, and general disturbance results. The principal symptoms, however, are usually manifest in some part of the *respiratory* organs, because the mucous membrane attempts to do the work of excretion, and having double duty it becomes inflamed and irritated, and according to the particular part affected we have cold in the head, bronchitis, sore throat, hoarseness, cough, etc.

But the respiratory organs are not alone affected by a cold. Sometimes it is the entire system, and a fever is

result, or it may be some part of the alimentary canal, producing indigestion; diarrhœa, or dysentery.

The remedy for a cold is prompt restoration of the functions of the skin. Anything that will promote perspiration will tend to accomplish this. It should be held in mind, however, that when perspiration has been abundant, the body is liable to take cold again if exposed to drafts or cold air unprotected. The skin should always be rubbed thoroughly dry after the perspiration is washed off.

The old saying, "Feed a cold and starve a fever" is not good advice. Either a cold or a fever may often be cured by refraining from food, on the principle that by giving the digestive organs rest, the energies of the system can be applied toward throwing off the obstruction and restoring the action of the organs of secretion.

MISCELLANEOUS HINTS.

When coins, buttons, or other small objects are swallowed they generally pass through the intestines without doing any harm. Keep the bowels open by purgatives if necessary. If objects lodge in the throat, send for a physician and keep the patient quiet. In case of objects getting into the windpipe, or as it is usually called, choking, hold the head low and slap the back. Send for surgical aid if no relief in a few minutes.

Pins and needles which are swallowed often make their way through the tissues, and escape without injury, perhaps years afterward.

When objects get into the ears or nostrils the attempts to remove them generally result in pushing them further in. A bean or similar object may often be dislodged from the nostril by closing the other nostril and having another person blow forcibly into the mouth. In case of small objects in the ear, pour in or inject a little tepid water and

turn the head to one side. Objects, as cherry-stones, often remain in the ear for years, and do no apparent harm. While it may not be best to leave them, there is no cause for haste or alarm. A few drops of oil poured into the ear will suffocate any insect which may have crept in.

When dirt gets into the eyes, do not rub them. Sometimes if the lid be held open by an effort of the will the tears will wash the particles to the lower inner corner, and they may be removed by the corner of a handkerchief, or by forcibly blowing the nose. If these means fail, turn the lid up over a pencil and look for the object. When found, remove by the corner of a silk handkerchief.

A few ashes sprinkled upon icy steps or sidewalks may prevent broken bones.

A wind colic may often be relieved by making forcible attempts at eructation (belching.)

Never give a blow in the region of the stomach, nor upon the heads and hands of children. (I am not an advocate of corporal punishment.)

Do not raise a fainting person, but allow him to lie flat upon the back, secure fresh air, and sprinkle cold water in the face.

If a person falls down in a fit of apoplexy or rush of blood to the head, raise him up and loosen clothing around neck. Send for doctor.

A person may be found apparently dead. He has probably fallen in a fit of apoplexy, or is dead drunk; the smell of liquor will often prove the latter.

If you should find a human body lying dead, do not move it, but examine without touching, or at least disturbing the position; make a hasty survey of the surroundings to ascertain whether there are weapons, etc., present, and to be able to recognize the location again, then retrace your steps (do not go past the body) and inform the first

person you meet, and take information as quickly as possible to a magistrate, or officer of the law. By observing these directions you may avoid trouble.

If you get wet through your clothes, as long as you keep exercising there is little danger of taking cold, but as soon as possible change for dry clothing, having first rubbed the body dry with a towel. Rubbing the skin well with a dry towel will prevent taking cold after perspiring from unusual exercise.

Persons long confined to bed with sickness are apt to have bed sores, caused by the continued pressure of the body upon the points of support. These sores are often distressing, and if the person is not frequently examined they may reach a frightful degree of severity before discovered. The body should be examined every day, and when a slight redness appears the parts should be bathed with water, and the pressure relieved by pads or cushions so arranged as to bring the weight upon another part.

Boils and carbuncles, though extremely painful, are never dangerous. Much pain may be avoided by an early discharge of the pus. The point should be picked open with a needle or sharp knife blade, and pressure applied, gradually increasing it. This will cause some pain, but not so much as the matter will cause if allowed to remain. A poultice of anything that will retain moisture is good to facilitate the discharge of the pus. Felons, or whitlows, should be opened at an early stage. A deformed hand is often the result of a neglect to cut open a felon.

An ingrowing toe-nail may be relieved, partially at least, by scraping the arched portion of the nail till it is quite thin.

It is well to heed the cravings of a sick person for some particular food or drink. It is often the means of cure. But one should use a little judgment in the matter.

CHAPTER IV.

CURIOUS FACTS CONCERNING LIFE AND DEATH.

IDIOSYNCRASY.

There is a peculiar state of the system, or a peculiarity of constitution to which physicians give the name idiosyncrasy. Under this condition certain articles of food, drink or medicine produce extraordinary and peculiar effects different from their ordinary action. Thus I have known several persons who could not use turpentine as a liniment or take the smallest quantity internally without serious sickness or eruptions of the skin. The smell of certain medicines will produce nausea and vomiting in some persons. I once visited a patient who was thrown into a violent excitement on my entering the room. He cried out "Don't give me rhubarb, doctor." I had not thought of giving him rhubarb, but happened to have some in my medicine case. Many persons faint at the sight or smell of blood. Lobsters and shell-fish produce in some persons skin diseases. A physician of my acquaintance says cheese invariably acts as a purgative in his own case. Feuchtersleben relates the case of John Péele who had an antipathy for all kinds of money. His father believing that it was only imagination, secretly placed some copper coins in his pockets. The man immediately fell into violent convulsions. Another case is given of Hobbes, who, when left in the dark, fell into a state bordering upon madness, but was relieved as soon as light was admitted.

Gross says he is acquainted with a physician in whom the smell of ipecac always produces a violent attack of asthma lasting several days, and his perception of the presence of this drug was so keen that if a dose of it be compounded on the first floor of a house, and he be in the third story, he was instantly seized with wheezing and spasmodic cough. He gives another case of a man in whom an attack of asthma is brought on by the presence of feathers. These cases of "idiosyncratic asthma" are not unfrequent. A case is given where a merchant was attacked with asthma whenever fresh coffee was handled in his presence. Trousseau tells of himself that a bouquet of violets would give him the asthma. These cases are all examples of reflex irritation, but called idiosyncratic, because peculiar to certain individuals.

REPAIR OF INJURIES.

When tissues are destroyed or separated by violence or diseased action, nature at once begins to repair the injury by a process which is usually attended with inflammation, that is, a condition characterized by pain, redness, heat and swelling. This inflammation is nearly always attended by a separation from the blood and a deposition into the organs or tissues, or upon their surfaces, of a peculiar substance called *lymph*, *plasma* or *plastic matter*. This is the great agent in the repair of injuries. So powerful is this tendency of nature to heal, that parts completely separated from the body, if immediately replaced, often unite again as perfect as before. Pieces of fingers, noses and ears have been completely severed and successfully reunited.

Although this plastic matter which is poured out for the repair of injuries is usually so beneficial, it is often the source of injurious effects. In croup, the lymph is often

organized in the form of a false membrane which closes up the windpipe, resulting in the death of the patient unless an artificial opening be made for the admission of air. But frequently the membrane is so extensive that no operation can be successful. In this way the natural outlets of the body are often closed up by the deposit of plastic matter, and serious consequences result. The pleura or membrane surrounding the lungs often becomes permanently adhered to the walls of the chest, the intestines sometimes grow fast to each other; in fact, a great variety of obstructions are the frequent result of this effort of nature to repair injuries. The transparent part of the eye sometimes becomes opaque by deposit of lymph, and the joints are made stiff by the same material.

Bullets, pins, needles and other foreign objects are often inclosed by this plastic material and rendered harmless occupants of the body, and remain thus through life. They are then said to be encysted. The case of President Garfield illustrated both blood poisoning from pus and the encysting of a bullet.

RHINOPLASTY.

A knowledge of this wonderful reparative power of nature led to the discovery of what is known as "plastic surgery," or the "restoration of lost parts by the transplantation of healthy integument from some neighboring region." Rhinoplasty, or the operation of restoring a lost nose by transplanting tissue from another region, is probably of ancient origin. Galen says that the Egyptians practiced it, but that national pride and self-interest caused them to keep the art a secret among themselves. It is thought that the art was practiced by the priests of India from very ancient times. In that country the cruel custom of cutting off the noses of criminals has existed for

ages, and sympathy for these sufferers perhaps led to an attempt to restore the deformity. In 1599 Gasper Talia-cotius, a professor of anatomy and surgery in the University of Bologna, published a work describing the method of restoring lost noses, lips and ears by this art, and since his time the operation has often been called the Taliacotian operation. His method consisted in raising a flap of skin on the arm, and stitching it fast to the mutilated nose, the head and arm of the patient being held together for a couple of weeks by a complicated set of bandages, after which time the union of the flap with the face being sufficient the extremity in connection with the arm was cut loose. Modern surgeons have improved much upon the old method, and at present the flap is usually taken from the forehead, a small portion being left in connection, and the whole twisted around and carefully adjusted to the mutilated part.

There are various causes which may render this operation necessary. In Germany noses are often mutilated in sword dueling which is quite common, in some countries they are cut off as a punishment. In our country noses are seldom lost by accident or design, but are not unfrequently eaten off by cancers or other diseases.

TRANSPLANTING TEETH.

It has long been known that if a tooth be extracted and immediately replaced it would grow fast again, and teeth have been successfully transplanted from one person to another. Gross says this custom was much in vogue during the last century, but was abolished when it was discovered that the practice was liable to transmit disease.

Some curious experiments were performed about the middle of the eighteenth century by Dr. Hamel. He successfully grafted the spur of a cock upon the comb of the

same fowl. John Hunter performed the singular experiment of inserting a fresh human tooth into the comb of a cock where it became firmly fixed, and after the death of the animal it was seen that blood-vessels had extended up into the roots of the tooth.

SKIN GRAFTING.

This is another of the triumphs of modern surgery. In cases where by accident or disease large portions of the skin have been removed, the healing process may often be facilitated by cutting minute portions of skin from sound parts, and planting them on the raw surface, where they become attached and grow, increasing in all directions from the center point.

SUBCUTANEOUS SURGERY.

It has long been known that wounds made internally, and not in communication with the air heal rapidly, and with little inflammation. If a tendon be cut off by an incision which would involve the skin and surrounding structures, making an open wound, the healing will be very slow, and often the union will be imperfect, but if it be cut under the skin it will heal rapidly, and it may be lengthened by new material being formed to fill the gap made by the retraction of the divided ends. In this way, deformities, such as club foot, which is caused by shortening of the tendons, are often remedied, the incision through the skin being made with a very narrow-bladed knife.

DEGENERATION.

Peculiar changes sometimes take place in the tissues of the body in which the natural substance is removed wholly or partly, and another kind of substance takes its place. The most important of these changes are the fib-

rous, the calcareous and the fatty. Thus when an artery has been tied the portion between the place of the ligature and the first large branch is converted into a fibrous cord. Ligaments and serous membranes undergo this fibrous degeneration. Calcareous degeneration is not of unfrequent occurrence, especially in the arteries. In this case, there is a deposit of carbonate and phosphate of lime, rendering the tissues hard and brittle. Fatty degeneration may take place in almost any of the tissues of the body. The liver is very liable to be thus converted into a fatty substance. It is often the result of habitual use of alcoholic liquors.

PETRIFIED HUMAN BODIES.

Many persons believe that human bodies when buried, may be petrified, or turned to stone. No real cases of this kind are on record. It is, however, interesting to know what has given rise to such a belief. In the first place, many have an erroneous idea of petrification. The animal or vegetable substance which becomes petrified is not converted into stone, but there is merely a replacing of the substance of the body by stony material so as to preserve the original form and structure more or less perfectly. Now the material which takes the place of the tissues of the animal or plant must be in a state of solution. The parts of the animal or plant decay by the natural process, and are converted mainly into gaseous substances which pass off into the surrounding soil or rock leaving a mould, or cast of the body. This mould is filled up by the stony matter, and when it hardens a perfect copy of the original being is produced. Now a body which has a hard shell on the outside which would resist decomposition long enough to form a mould in the surrounding earth may in time become petrified, but so soft a structure

as the human body or that of the higher animals could not form this mould, and hence petrification would be impossible. There are, however, certain mineral springs which contain so large an amount of mineral matter in solution that when an object is immersed in them for a short time, a coating of stone is formed on the outside, and small animals are sometimes petrified in this way.

The fact that parts of the human body sometimes undergo a waxy degeneration before and even after death, may have led to the belief in petrified human bodies. In this waxy degeneration, the parts become firm like wax, and increase much in weight, the new substance somewhat resembling starch. We must also take into consideration the fact that many persons have a dread of touching a dead body, and consequently would not be apt to make very thorough investigations in such cases. A few years ago there was exhibited throughout the country what was known as the "Cardiff giant," thought by many to be a petrified man of enormous size, but the whole thing proved to be a fraud; the giant having been chiseled out of stone in Chicago, taken secretly to the State of New York, and buried, and afterward exhumed and exhibited.

HUMAN HORNS.

Among unnatural growths and tumors upon the human body, perhaps the most remarkable are those which resemble in form and consistence the horns of a sheep or goat. They are met with on various parts of the body, but most frequently upon the scalp. In the British Museum there is one of these human horns preserved. It is eleven inches in length, and two and a half inches in circumference. A case is recorded in the New York Medical Repository, of a human horn which measured fourteen inches in circumference at its base and had three

branches. Gross quotes from a book by Increase Mather where the latter mentions the case of a "man that has a horn growing out of one corner of his mouth, just like that of a sheep; from which he has cut seventeen inches, and is forced to keep it tied by a string to his ear, to prevent its growing up to his eye."

BITES OF A HUMAN BEING.

It is a common belief that the bite of a human being is exceedingly poisonous, and that the saliva is the virulent agent; while it is true that wounds inflicted with the human teeth are frequently attended with violent symptoms, the saliva has probably nothing to do with it, but as the parts are usually much bruised and lacerated the healing is necessarily slow, and in such cases erysipelas and other serious consequences are liable to ensue. It is remarkable, however, what serious results sometimes follow slight causes. Persons have been killed by the sting of a bee, the bite of a spider, even by the bite of a fly. The bite of many of the lower animals, as the dog, cat, rat, etc., is frequently followed by dangerous erysipelas.

CURIOUS WOUNDS.

There are some curious facts connected with gun-shot wounds. Bullets have been known to strike the sharp edge of a bone, as the crest of the tibia, and be split in two, three, or more pieces, each fragment issuing at a separate orifice from the limb. An instance is on record of a ball passing for some distance into the muscles of the breast and emerging again at the point of entrance, being thrown back by the recoil of a rib. In another instance the ball struck the forehead and passed almost completely around the skull beneath the scalp, and emerged at a point close to the place of entrance. In a similar manner balls

have been known to travel almost completely around the body, following the course of a rib. In the war of the Crimea, a soldier was lying upon his face with his head toward the enemy; a ball struck his head, traversed the entire length of his body, and emerged at the knee.

The following cases are recorded in Chamber's Journal by an army surgeon. A man was struck by a ball on the outer edge of the orbit of the eye; the wound was dressed and the man went into action again and was struck by another ball in exactly the same place. Another was struck on the outer edge of the orbit, the wound healed and the man was well for eight years, when an abscess formed, and the half of a bullet appeared. It seems that the ball had been split in two, one half flying off, the other lodging behind the eyeball. A man was shot through the abdomen, the ball coming out through the hip bone on the opposite side. The man lived thirty-six years afterward.

The bleeding from gun-shot wounds is hardly ever proportional to the extent of the injury. Sometimes a limb is entirely torn off with very little hemorrhage ensuing. The reason of this is, that the parts are somewhat condensed by the force of the ball, and owing to the lacerated nature of the wound, the blood clots more readily.

REMARKABLE RECOVERIES.

A remarkable case of recovery from an arrow wound is given by Dr. Forwood of the U. S. A. An Indian was shot in the hip with an arrow, the head of which penetrated the bladder through the large opening in the hip bone. The wound healed and the man was well for six years, when he began to have symptoms of gravel. An operation showed a stone in the bladder formed around the arrow point, weighing nearly two ounces.

There have been some remarkable recoveries from injuries to the brain, and on the other hand very slight injuries have resulted in death. One case is recorded of a girl ten years old in whose head a circular saw made a cut the length of four and a quarter inches, dividing a considerable portion of the brain, yet recovery was rapid and complete. Dr. Haymond, of Indianapolis, relates a case in his own practice of a man who had three square inches of the skull torn out of his forehead by a threshing machine, exposing the brain, part of which was protruding through the dura mater, which was torn in a number of places. At the same time the man's arm was broken. He made a complete and rapid recovery. The injury did not render him insensible for a moment, and when the doctor arrived he charged him to be careful to dress his arm well, for he wanted to get to work again as soon as possible. What was singular, the arm would not unite until the wound in the head had healed. In such cases the bone is not replaced by a new growth, but the skin and cellular tissue beneath become thicker and form a protection to the brain. It was formerly the practice to put in a silver plate to take the place of the removed bone.

Perhaps the most extraordinary case on record happened in 1848 in the practice of Dr. Harlow, of Vermont. A man aged twenty-eight was engaged in blasting rocks, and a tamping iron three feet seven inches in length, one and one-fourth inches in diameter, and weighing thirteen pounds, was blown through his head, entering near the angle of the lower jaw, passing obliquely upward, traversing the skull and front part of the brain, and emerging at the top of the head. The man made a perfect recovery with the exception of the loss of one eye. He lived twelve years after the accident, and died from some other cause.

A peculiar case was reported in the London *Lancet* for January, 1882. A man determined to commit suicide drove a dagger, by striking it with a mallet, into his skull. The instrument was three and a third inches long, and one-third of an inch wide. He struck it a dozen blows and felt no pain. The instrument penetrated the bone and brain near the top of the head. All ordinary efforts to extract it were in vain. He finally was obliged to go to a copper-smith shop and have a chain fastened to the dagger and wound around a cylinder which was turned by steam power. After the dagger was extracted he went to the hospital and remained in bed ten days, during which time the wound healed perfectly, and he suffered no pain and had no perceptible fever.

A few instances are on record of bullets becoming encysted in the brain substance and remaining comparatively harmless. In the great majority of cases, however, foreign substances provoke inflammation, which speedily ends in death. The mere loss of brain substance does not necessarily occasion death or injury to the mind. In a few cases where a considerable portion of the brain substance was lost, the intellect seemed to be improved, rather than weakened.

HYDROPHOBIA.

The word means literally, "dread of water," and in the human subject this is a characteristic symptom of the disease. It is the result of the introduction into the system of a peculiar poison which is generated by certain animals, and which, being introduced through the saliva, is capable of propagating itself by inoculation. The animals capable of generating this poison belong chiefly to the canine family, consisting of the dog, wolf, fox and others. Other animals, including man, if bitten by one of

these animals in such a condition, are attacked by the disease and with the probable exception of man, are capable of communicating it again to other animals. Animals under the influence of this poison are said to be *rabid*, or *mad*. A peculiarity of this poison is that it remains latent or inert in the system for a period varying usually from a few weeks to several months; cases are given where four, five, and even twelve years elapsed before the disease broke out. It prevails in all parts of the world, and in all seasons of the year, but seems to be more frequent in cold than in warm climates. The wound inflicted by the rabid animal heals as readily as any other wound, and nothing seems wrong until the period of incubation has elapsed, when the part begins to itch or burn and become sore and irritable, and very painful and horrible symptoms rapidly ensue. On attempting to drink the patient is seized with violent convulsions; though he is tortured with thirst he cannot swallow a drop of water. Light, noise, and currents of air will throw him into paroxysms of violent delirium. The time of the attack varies from eighteen hours to a week, three days being about the average. The disease is said to be invariably fatal, no reliable accounts of cases of recovery being upon record.

The symptoms of hydrophobia in the dog are characterized by great restlessness, a disposition to snap at every object, violent delirium, and a profusion of saliva. To communicate the disease, it is only necessary that a portion of the saliva be introduced into the blood. Often persons are bitten and not inoculated because the saliva is wiped off upon the clothing, and does not enter the wound. As soon as a dog shows symptoms of madness, he should be confined and watched; if it is impossible to do this with safety, he should be killed at once.

GLANDERS.

The horse, the ass, and the mule have the power of originating a disease characterized by a poison which, if introduced into the human system, produces nearly always fatal results. This disease is called *glanders*, *farcy*, or *equina*. It may be propagated through the atmosphere the same as many contagious diseases. It seems to affect mainly the mucous membranes of the air passages, especially of the nose.

GOITRE AND CRETINISM.

Goitre, bronchocele, or "big-neck" is a peculiar affection deserving a passing notice. It is an enlargement of the thyroid gland which lies in front of the larynx or "Adam's apple" in the neck. The tumor sometimes reaches the size of a human head. There is no pain, nor discoloration, and it is attended with no disturbance of the system unless when it becomes so large as to press heavily upon the throat, and cause difficulty of breathing, or obstruct the circulation. It is, moreover, peculiar from the fact that it is confined mostly to the valleys of mountainous regions. The valleys of the Alps, Appenines and Pyrenees are especially characterized by its prevalence. It is also common in Derbyshire, Norfolk and Surrey, England, and sometimes found in the mountainous regions of Vermont, New Hampshire, Connecticut, New York, Virginia and Pennsylvania. It is more common in women than in men, and in children than in adults. It is said that in those regions where it prevails the inhabitants consider the enlarged neck a mark of beauty, and are rather proud of the deformity.

The cause of goitre is in some way connected with the locality, but its exact nature is not known. It is thought

that the moist atmosphere and the habitual use of water strongly impregnated with lime are predisposing causes. It is often associated with a peculiar condition called *cretinism*. In some regions of the world, and especially in the close narrow valleys of the Alps and Switzerland, there exist numbers of strangely perverted specimens of humanity. They are generally small, even dwarfish in size, have large heads, staring eyes, vacant features, crooked limbs, soft, flabby muscles, many cannot articulate, some are blind, and some deaf. It is in fact, a kind of idiocy, accompanied by various bodily deformities, and in a bad case of the disease the individual presents the most pitiable spectacle imaginable, the most hideous burlesque upon humanity. Persons so afflicted are called *cretins*.

PECULIARITIES OF CIRCULATION.

There is an occasional case where the pulse, through life and under conditions of perfect health, beats at the unusual rate of 100 or even 120 per minute. Heberden records a case of an old man of 80 in apparent good health whose pulse beat at the slow rate of 26 per minute. Frequently the pulse is intermittent, or irregular in its beat. This is sometimes a natural peculiarity, but often caused by paroxysms of grief, terror, anxiety, passion, or by mental or physical fatigue, adverse fortune, or old age.

The heart has nerve centers of its own which in a degree keep up its action, but these centers are connected with other nerve centers by means of nerve fibers, and the action is thus kept up. There is also a set of nerve fibers which exert a checking (inhibitory) influence upon the heart's action. If these nerves are stimulated the heart's action is checked, or may be entirely stopped. A singular case is on record of a man who had a tumor in his neck, which came in contact with the pneumogastric nerve which

has inhibitory fibers going to the heart. By pressing upon this tumor, he could at will so stimulate these nerve fibers as to stop the beating of his heart. Such an experiment would be dangerous, for if he kept up the pressure long death would ensue, as the heart would lose its power to resume its action.

GASTROTOMY.

This term is applied to the operation of making an artificial opening into the stomach through the abdominal walls for the purpose of introducing food. In the year 1822 a young man named Alexis St. Martin, a Canadian by birth, but in the service of the United States, was wounded by the accidental discharge of a gun. The buckshot with which it was loaded tore open his side making a frightful wound through which a portion of lung protruded.

Dr. Beaumont, the U. S. army surgeon who was called, found the food which the man had eaten an hour before issuing from the wound in a half-digested state, showing that the wound also penetrated the stomach. The wound healed, but the portion of the stomach injured did not unite together, but grew to the edges of the wound in the abdominal walls, thus leaving an opening about $2\frac{1}{2}$ inches in circumference, through which food could be introduced into the stomach, or the contents of the stomach could be taken out at any time, and examined. Dr. Beaumont improved this opportunity to study the process of digestion and upon his observations many of the statements concerning the time, etc., of digestion given in our text-books on physiology are based.

Sometimes it happens that the œsophagus becomes partially or completely closed by its walls growing together. This may occur as a result of swallowing acids or

caustic substances which destroy the mucous membrane. In this case nature in attempting to heal the wound, throws out plastic lymph which more or less completely closes the channel, producing what is called a stricture of the œsophagus. What is to be done in case of complete closure of the passage to the stomach? If science does not come to the aid of the patient he must certainly starve to death. It has long been known that if the body be immersed in liquid food a considerable portion would be absorbed through the skin, and the patient might thus be kept alive for a long time. Also it is known that food may be injected into the rectum, and be absorbed, nourishing the system. But these methods of feeding would not only be inconvenient and disagreeable, but would tend to produce disturbances of the skin or the intestines. There is a better method, and that is to perform the operation of gastrotomy, or in other words make a gastric fistula, through which solid and liquid food may be introduced into the stomach. In this case the surgeon makes an opening through the abdominal walls, and through the walls of the stomach, then stitches the walls of the stomach at the edge of the wound to the walls of the abdomen. These two walls grow together, leaving a fistula or opening into the stomach, which can be kept closed by a compress, the incision being made so as to produce a flap, or valve-like edge, to the orifice. Through this opening food may be introduced by inserting a funnel. But in this case digestion is not perfect since the patient does not get the benefit of the saliva and the taste of the food, yet it is sufficiently so to maintain life and a tolerable degree of health. Veneuil, a French surgeon, operated on a young man aged seventeen, who was nearly starved from stricture of the œsophagus, and by feeding him through the fistula his weight increased one-fourth in two months.

A German surgeon has lately succeeded in constructing an artificial œsophagus which works admirably. A boy eight years old had stricture of the œsophagus from swallowing sulphuric acid. The surgeon made a gastric fistula and inserted a short tube, to which the boy could fasten a rubber tube long enough to reach to his mouth. The upper end was funnel-shaped, and when the boy wished to eat he chewed his food thoroughly, then placed this funnel-like extremity to his mouth, and by blowing forced the food down the rubber tube into his stomach. The boy, who before the operation was nearly starved gained rapidly in weight, and continued to grow and do well.

DR. TANNER'S EXPERIMENT.

There are some remarkable cases of persons going without food for long periods of time. None are so remarkable, nor so well authenticated as that of Dr. Tanner. On the 28th day of June, 1880, this gentleman began in the city of New York, a forty days' fast. Men eminent in the medical profession became interested in the case, and reliable physicians were appointed to watch him carefully day and night to see that no fraud was practiced. The result was that the doctor lived forty days and forty nights without partaking of a particle of solid food, although he drank freely of water. He has, as he claimed, accomplished on a previous occasion a fast of forty-two days, begun for the purpose of curing an inflammation of the stomach, and continued as an experiment.

How can this be explained? When he began the fast, he was a very heavy-built, fleshy man. At the close of the fast he was very much reduced in weight. He had been living upon his own tissues, especially the fatty material which was stored up in his system. No man could live over nine or ten days without either food or drink,

because water is necessary to the action of the absorbent vessels, and the circulation. The surplus material in Dr. Tanner's body was absorbed, carried into the general circulation, and consumed, furnishing animal heat and vital power. A peculiarity of this case was that the doctor astonished the medical men by eating enormous quantities of food as soon as the time had expired, and continued for several days to make up for his abstinence by unlimited indulgence without experiencing any unpleasant symptoms. It had always been taught that starving persons should be fed very carefully, that if allowed all the food they wanted serious consequences would follow, and such has been the experience in most cases where food was allowed in unlimited quantities, but Dr. Tanner proved an exception to the rule.

TRICHINA AND THE TAPEWORM.

Trichina Spiralis is the name of a minute worm, or parasite, which has a peculiar history. It is found encysted, that is coiled up in a minute case of calcareous matter in the muscles of the pig. If the flesh of a pig containing these cysts be eaten by man, or other animal, the worms are freed from their cases, grow larger, and multiply in the intestines; the young worms then bore through the tissues of the body, and finally make their way to the muscles, where they become encysted as their parents were before, and remain thus quiescent until the flesh of the animal bearing them is taken into the stomach of another animal. The cysts cannot be seen with an ordinary lens, but require a microscope of considerable power to show them. Their number in some cases is astounding, a single ounce of flesh having been known to contain three hundred and fifty thousand of them. When they are traveling through the tissues, from the intestines to

the muscles, they produce intense irritation, the victim suffering great pain and fever, which frequently results in death. After they are encysted in the muscles they are harmless.

It is not known where the pig gets these worms, but they have been found in the rat, mouse, dog, cat, rabbit, and some other small animals, and it is supposed that the pig being an omnivorous feeder, gets them by eating rats and mice. The disease produced by these worms traversing the body is called *Trichinosis*. One pig containing these worms may be sufficient to produce disease in as many persons as may partake of its flesh, as every small portion will contain numerous cysts. The flesh, however, must be eaten raw, or only partially cooked, as thorough cooking kills the trichina. These epidemics of trichinosis have been most extensive among the Germans, as the habit of eating raw pork is common among them.

The *tapeworm* has also a peculiar history, and as it is not an unfrequent occupant of the human alimentary canal, it deserves a notice in this connection. There are said to be upward of two hundred species of tapeworm, but the one commonly found in the human intestine is known as the *Tenia solium*. They vary in length from ten to thirty-five feet, and are composed of flattened segments or joints, with a head which is armed with a circle of hooks, with which it holds to the walls of the intestine. There are sometimes as many as one thousand segments. Certain of these segments contain eggs, which under the proper conditions develop to form new tapeworms. The manner in which these eggs are developed is peculiar. They may leave the intestines in three ways: (1) The joints containing them may come away and pass out with the excrement. In this case they are often eaten by pigs, and when in the intestines of this animal the eggs devel-

ope into worms, and find their way to the tissues, where they become encysted, and are known as *cysticerci*, and may be seen as little white specks, constituting the so called "measly pork." Now, if this "measly pork" be eaten raw by a human being, the cysts are broken in the intestines and develop into the tapeworm. (2) The eggs may be discharged from the segments of the worm in the intestines, and the young worms find their way to the tissues of the body, where they take the same form that they do in the pig. These cases are rather rare. In 1864 a man died in France, aged 77; an examination of his body after death disclosed two thousand cysticerci in various parts of the body. (3) The mature joints may be dissolved in the human intestine and the eggs be liberated and distributed as in the second case.

The eggs of the tapeworm may get into the human system in various other ways besides that of passing through the body of a pig. They may get into the water we drink, or upon vegetables, as lettuce or cabbage, and thus be taken into the system.

CONCRETIONS.

These are solid masses of foreign matter within the body, either formed by chemical changes in liquids, or by accidental cohesion of solid particles. In the first case they are called *calculi* and are generally of a limelike substance. They are found in the bladder, when they are known as stone or gravel. Sometimes they occur in the gall cyst, when they are known as gall stones. The second class, those formed of solid particles, are the most remarkable; they are found in the stomach and intestines, and formed of undigested portions of food or of substances improperly swallowed. Girls have been known to form the habit of swallowing their own hair, and this col-

lects in balls in the stomach. A case occurred in England of a girl who had a concretion consisting of a mass of hair and string the shape of the stomach, and almost filling it. Oatmeal when coarsely ground has been known to form concretions in the stomach. In the rooms of the agricultural society at Indianapolis, Ind., there are on exhibition sixty-four concretions of hair, varying in size from a hen's egg to a human head, almost perfectly spherical. They were all taken from the stomach of a cow which had been slaughtered for beef.

A REMARKABLE CASE.

In 1731 there was exhibited before the Royal Society of London, a boy who had a skin closely resembling the bark of a tree. It was hard and insensible, did not bleed when cut, was three-fourths of an inch thick, and resembled warts run together. This covering he shed once a year. He was again examined at the age of forty, and found to have the same shelly covering. He had been twice salivated and had exposed himself to the small-pox with the hope of getting rid of it, but without success. He had six children, all of whom had a like covering. This statement rests on the authority of Dr. Prichard, the distinguished ethnologist.

HAIRY PEOPLE.

There are some remarkable cases of unusual growths of hair. One case is on record of the hair of a woman reaching the length of 6 ft. 2 in. Men's beards sometimes reach a remarkable length. The cases of women with beards are not rare. There was exhibited in London a woman named Julia Pastrana, supposed to be a Mexican. She had a thick masculine beard and an abundance of hair on the forehead, breast, shoulders, lips, spinal column and

lower extremities. There were not long ago exhibited in Berlin and Paris a father and son who attracted much attention from scientific men, on account of their wonderful development of the hair upon their bodies. They were called "dog men" from the resemblance of the face of the father to that of a Skye terrier. The man was the son of a Russian soldier, and in order to escape the derision of his neighbors fled in early life to the woods, and he lived for some time in a cave. His face is completely covered with a silky down three inches in length which is not true hair, but an extraordinary development of the fine down which covers the entire surface of the body. The eyelids are covered with this hair, and long flowing locks proceed from his nostrils and ears. Over his body are patches thinly strewn with hairs two and a half inches in length. The son has not quite so great a development of hair as the father. Both are almost toothless, the father having but five teeth, one in the upper jaw and four in the lower, the son but four teeth, all in the lower jaw.

Instances of the hair turning gray in a few hours under the influence of great grief or fright, are numerous and well authenticated. In some cases under such circumstances it has been known to regain partially or wholly its original color, but there are no cases where hair which turned gray in the natural way, returned to its original color.

VACCINATION AND THE GERM THEORY.

The word is from the Latin *vacca*, a cow. The process consists in introducing into the human system a specific disease peculiar to the cow and called *vaccinia*, or cow-pox, with a view to prevent or modify an attack of a more severe disease peculiar to man known as *variola*, or small-pox. This process, which has proved so successful, and has saved so many lives, and rendered a loathsome and

dangerous disease comparatively harmless, was discovered by Edward Jenner, an Englishman (b. 1749.) It had been known that cow-pox was sometimes communicated to man from the cow, and it was a popular notion that when one once had cow-pox he would not take small-pox. This led Jenner to an investigation of the nature of cow-pox and a series of experiments, from which he learned that the cow-pox might be transferred to man by introducing into his blood a small portion of the matter, or virus from the eruption on the cow, and that it could be then continued from one individual to another by successive transmissions in the same manner, and that in some way it effected a change in the condition of the individual so that he was not liable to take the small-pox, or if he did it was in a much modified form known as varioloid. At the present time vaccination is usually performed by using virus direct from the cow, as there is danger of transmitting other diseases when the virus is taken from one individual to another.

When the virus from a small-pox patient is introduced into the blood of a healthy cow, the animal is affected with cow-pox, and the virus thus obtained is used for vaccination. The horse is also sometimes afflicted with a disease called horse-pox, which seems to be identical with cow-pox. Whether the protection of vaccination lasts through life is yet a disputed question. It is best, however, to be vaccinated about every ten years, and be on the safe side. As regards the efficiency of vaccination numerous statistics show that the person well-vaccinated runs only one-seventieth part of the risk of taking small-pox, that the unvaccinated person does. The theory has been advanced that many if not all diseases are the result of a growth in the blood of minute organisms, either animal or vegetable, the germs, or seeds of which are introduced

from without, either through the food, water, or atmosphere, or by actual contact. This theory explains contagious diseases. That there are germs floating in the air, is shown to be at least probable by the fact that in hospitals where wounds are dressed, and operations performed, and many persons are sick at the same time, erysipelous and other severe disorders occur, and wounds heal very slowly, unless the operations of amputations and dressing wounds be performed under a spray of carbolic acid, and the wounds themselves treated with weak solutions of this substance, which destroys all germs of life. Under this carbolic acid treatment the serious results above enumerated are almost entirely unknown.

In the case of small-pox and similar diseases it is supposed that the germs are introduced in some way into the blood, grow and multiply, and having attained their development, the old ones die and the new ones are thrown off, to go through the same process in some other body. The protection of vaccination is explained by supposing that the germs of cow-pox remove some element from the blood which furnishes food for the growth of the small-pox germ. The fact that one attack of small-pox, measles, etc., usually protects the person from a subsequent attack, is explained on the same principle.

Now it has been proposed to attempt to modify or prevent other diseases, such as typhoid fever, yellow fever, etc., by inoculating an animal with the disease, and then vaccinating, or inoculating the human being again with the virus produced by the disease in the animal operated upon. This they call "cultivating" the virus by passing it through the blood of some other animal, just as the small-pox virus is passed through the blood of the cow, and becomes the cow-pox. Many experiments have been performed, but as yet with no very satisfactory result.

FAT MEN

A certain amount of fat, or adipose tissue, is necessary in the human body, as it gives roundness and plumpness to the form, keeps in the animal heat, and furnishes a supply of fuel to keep up for a time the heat in case of abstinence from food. When it becomes excessive in quantity, it may be considered rather as a diseased, or at least an unnatural condition. The normal, or natural quantity varies in different periods of life, with the quantity and quality of the food, and with the amount of exercise. At birth there is usually a considerable quantity, which continues until about fourteen or fifteen, when it usually diminishes, and again increases in middle age, when it sometimes accumulates in enormous quantities. Fatty foods and foods containing starch and sugar, and also malt liquors, conduce to obesity. Sedentary habits, warm bathing and indolence of body and mind, are also causes. But frequently there seems to be an hereditary disposition or peculiar habit of body which is conducive to the formation of fat, and food and exercise are almost powerless to counteract it. Extraordinary deposits of adipose tissue in certain parts of the body characterize certain races of men. Thus in the Hottentot women fat is deposited so largely in the region back of the hips as to give this part of the body remarkable prominence.

Among the remarkable cases of fat men may be mentioned that of Daniel Lambert, an Englishman, born 1770. He died at the age of thirty-nine, weighing 739 lbs. His leg measured 3 ft. 1 inch in circumference, and his body was 9 ft. in circumference at the waist. His health was good, and his food did not differ from that of other men. He was 5 ft. 11 in. in height, and was a man of more than ordinary mental ability.

DWARFS AND GIANTS.

It was commonly believed previous to the beginning of the present century that giants of immense size once existed. The grounds for such belief were the reputed discoveries of colossal human bones, the assertions of some ancient writers, and certain statements in the Bible. The bones of extinct animals, as mastodons, mammoths, etc., were formerly supposed to be the bones of giant men. The great naturalist Buffon (b. 1707) described the fossil bones of an elephant as the remains of a human giant. Linnæus said, "I have a notion that Adam and Eve were giants, and that mankind from one generation to another, owing to poverty and other causes, have diminished in size. Hence, perhaps, the diminutive stature of the Laplander." The statements of ancient writers are partly fabulous and partly based upon the mistaking of the bones of extinct animals for human bones. As to the Scripture statements the word translated *giants* may as well have been translated *bearded, cruel, or violent men*. Goliath's height was 6 cubits and a span, which is reckoned to be only $8\frac{1}{2}$ ft., consequently he was not taller than some modern specimens. There is a human skeleton in the museum in Dublin, measuring 8 ft. 6 in., and one in England, 8 ft. 2 in. The statements of showmen cannot always be relied upon. When a man reaches the height of seven feet, he is more than a head taller than the great mass of men, and he appears to be very large. A little exaggeration in the statement of his height will not be called in question. Showmen also dress their giants in tall hats and thick-soled boots, which adds to their apparent height.

The ancients believed not only in the existence of men extremely small, but of whole nations of them. (See Pygmies in Chapter X, Book II.) But there have existed

some very diminutive specimens of humanity. Sir Geoffrey Hudson was a dwarf who up to the age of thirty was only eighteen inches in height, but then grew rapidly until he attained the height of forty-five inches. He was a great favorite of Henrietta, Queen of England. His portrait was painted by Van Dyck, the great artist, and his praises sung by the poet Davenant. It is said that he was once served up at table in a pie. He once fought a duel with a man of full size. The latter was armed with a syringe, and Hudson with pistols. He mortally wounded his adversary. Count Joseph Borowlaski, the Polish dwarf, was also noted. His height was three feet three inches. He was married to a woman of ordinary size, and became the father of several children. He lived to the age of ninety-eight. Nicholas Ferry was another celebrated dwarf. His height was less than three feet. At birth his height was only eight inches, and his weight one pound. General Tom Thumb (Charles Stratton), well known to many through the great showman, P. T. Barnum, died recently. His height was two feet nine inches.

As a rule, giants are short lived and not noted for intellectual power. Dwarfs on the other hand are usually long lived and exhibit considerable intellectual ability, and are especially noted for their fiery temper and lively disposition. The height of giants depends largely upon the length of the femur, this bone being proportionally longer than in ordinary men. The contrary is true of dwarfs, this bone being proportionally shorter.

FEATS OF STRENGTH AND SKILL.

One of the oldest of athletic games is wrestling. Some oiled their bodies to make the muscles more pliant and then rolled in sand that they might retain their hold upon each other. Pugilism is also very ancient; these

games were encouraged partly as a pastime, and partly for the purpose of developing their physical strength and skill, that they might be more efficient in war. Running races is also of great antiquity. It was necessary to cultivate

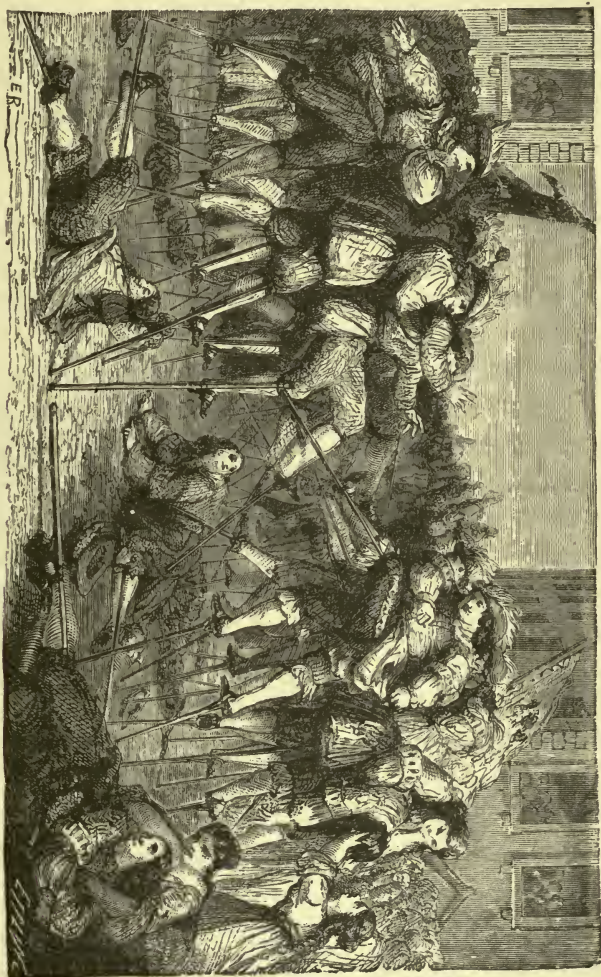


FIG. 273.—Battle on Stilts at Namur, (Eighteenth Century.)

this power, since it is so useful in war and hunting. Among people who lived on the sea coast and where large rivers were numerous, swimming was much cultivated.

The Persians were an exception to this, as they worshiped rivers and thought it profane even to plunge their hands in streams. Josephus, the Jewish historian, was noted as a swimmer. He once swam all night. Lord Byron was also noted in this art. Some nations are very expert at diving. Pearl oysters from which pearls are obtained are brought up from deep waters by men who dive for them. A story is told of Antony and Cleopatra fishing. Antony could not catch any fish and was annoyed at his want of skill in the presence of Cleopatra, so he ordered his servants to dive secretly and attach large fish to his hook. Cleopatra saw through the trick, and while pretending to be astonished at Antony's skill, had her own servants dive and attach an old salted fish to his hook.

Skating is an ancient art. The skate originally consisted of the jaw bone of an animal. The Germans are very fond of the art. Goethe, the great German poet, was noted as a proficient skater. Walking on stilts was once much practiced by the people in some parts of Europe. Battles were fought by men on stilts. The engraving represents such a combat which occurred at Namur, in Belgium, in the eighteenth century. In this battle six hundred young men were engaged. They walked on stilts four feet high, fastened to their legs, and fought with their stilts and with their elbows.

LONGEVITY.

It has been asserted by naturalists that animals live about five times as long as the period of their growth. But just when the full term of growth ends has not been accurately determined. Flourens, a French scientist, held that the sign which indicates the term of growth and development was when the soft extremities of the long bones unite firmly with the shafts. In man this occurs usually

about the age of twenty, consequently man ought to live one hundred years. We often see statements in newspapers of persons attaining the age of one hundred and ten, even one hundred and twenty years. Many of my readers have heard of "Old Parr" who was reputed to have lived to the age of one hundred and fifty-two, and of Jenkyns and others who were reputed to have lived beyond one hundred and ten years, but all such stories are now considered by good authorities as mere fictions. It cannot be shown on any reliable authority that any person ever attained the age of one hundred and six. Mr. Thoms, who has written a work on longevity, says: "Any evidence that can be produced of any human being having attained the age, not of one hundred and thirty or one hundred and forty, but of one hundred and ten years, will be found on examination to be perfectly worthless." Dr. Gardner says, "The historical evidence up to the present time fails in proof of any person's having reached even one hundred and five years."

DEATH.

From the earliest times pain has been considered a necessary accompaniment of death. Hence the terms, "death agony," "last struggle," "pangs of death," etc., have been in frequent use among all people. It was once considered an act of humanity to hasten death and anticipate the last struggle by suddenly removing the pillow, allowing the head to fall back, rendering breathing more difficult. It was a custom among the common people in some parts of Europe for the nearest relative to smother the dying patient by placing a pillow on his face and sitting upon it. In the time of Queen Elizabeth, when criminals were hung, the friends of the criminal were permitted to pull upon the feet of the suspended body to

hasten death by strangulation. Modern physiologists tell us that nothing is more erroneous than to suppose that death is necessarily accompanied by pain. It is a physiological process, and should be painless. It is true that the patient may suffer extreme pain for weeks, and even months before death, but in the last moments he suffers not, and the so called death struggle is only a reflex action of the nerves producing contractions of the muscles of respiration. When a chicken's head is severed by one blow of the axe, its body undergoes violent muscular contractions and it may leap several feet in the air, but there can be no pain because there is no consciousness, the brain, the seat of consciousness, being separated from the body. The last words of the great surgeon, William Hunter, were, "If I had strength to hold a pen I would write how easy and delightful it is to die." Louis XIV. said with his last breath, "I thought dying had been more difficult." Persons who have been very near death from drowning and restored, testify that dying is painless.

Death comes in but two ways, either by *syncope*, where the brain and nerves are overpowered from some cause, and all action of the nervous system ceases and consequently all the organs cease their action; or by *asphyxia*, where the lungs cease to act either from want of air or by having the nerve supply cut off from the brain. In this case the result is the same as in syncope, for when the lungs cease to act the blood is no longer pure, and the nervous system is soon overpowered by the poison in the blood. This poison acts as a narcotic, benumbing the nerve centers, and destroying consciousness. In cases of lingering death the lungs are the last organs to give up their work, and even after unconsciousness takes place they may continue to act, but becoming more and more oppressed, produce the "death gasp," and "death rattle."

PART III.—THE MENTAL POWERS.

CHAPTER I.

THE MIND.

Says Sir William Hamilton, "What we mean by the mind is simply that which perceives, thinks, feels, wills and desires." Mind and soul are frequently used synonymously, but more often the latter is used to indicate the seat of feeling and will, and the former to indicate the seat of intellect. In the definition of Hamilton, mind includes soul, and this is the sense in which I shall use the term.

In one sense the mind is a unit, yet we may consider it as composed of various parts which we call powers or faculties. A common classification of the mind is that into, the *intellect*, the *sensibilities*, and the *will*. The following brief outline of the mental faculties I have condensed mainly from Schuyler's "*Empirical and Rational Psychology*."

The *intellect* is that part of the mind by which it knows, or the faculty which gains knowledge. The intellectual faculties may be grouped under three heads, the acquisitive, the representative and the elaborative, or logical faculties. Of the acquisitive faculties we have consciousness, reflection, intuition, and perception. *Consciousness* is the knowledge the mind has of its own acts. Thus we know that we know, we know that we feel, and we know that we will. It is, therefore, inseparable from

any of the divisions of the mind, but is classed with the intellectual faculties, because it is essentially an act of knowing. *Reflection* is a complex faculty and includes the following processes: Abstraction, or the withdrawal of the thoughts from certain objects to concentrate them upon certain other objects; attention, or the concentration of thought upon a certain object; analysis, or the separation in thought of phenomena into constituent parts; synthesis, or the opposite of analysis; comparison, or the examination of two or more phenomena in order to detect resemblances and differences; discrimination, or the detection of differences; classification, or the grouping of phenomena according to resemblances and differences.

Intuition is that faculty whereby the mind immediately apprehends a necessary truth. Truths thus apprehended are said to be self-evident. This faculty is sometimes known as "common sense." Whether intuitions are the product of past experience of the individual, or of the race, or are born with us, is a matter of dispute. *Perception* is the power by which we gain a knowledge of external objects through the senses. Sensation is a necessary condition of perception. Sensation belongs, however, to the second group of faculties.

The representative faculties are memory, imagination, and fancy. *Memory* is one of the most important of the intellectual faculties. It includes retention, recollection, representation, and recognition. By retention is meant that an idea is consciously kept in mind. Recollection is the calling up of past perceptions. Representation is the act of reconstructing in consciousness what is recalled by recollection, and preserved by retention. Recognition is the act of identifying the former possessions of the mind as recalled, retained, and represented. The memory may be cultivated, but it is largely the gift of nature. Objects

and ideas are more easily remembered when associated with some more familiar objects and ideas, and when they are made vivid by glowing pictures or descriptions. There are many examples of great memory. It is said of the Roman philosopher, Seneca, that he could repeat two thousand names in the order given, and of Cyrus and Hannibal that they knew the names of all the soldiers in their armies, and of Themistocles, the Athenian general and statesman, that he knew every citizen of Athens. It has been said that great memory is an attendant of a weak judgment, but numerous examples are on record which disprove this position. The men above mentioned were men of good judgment and great mental power. Paschal, the great French philosopher ; Scaliger, the French philologist ; Leibnitz, the German philosopher and mathematician ; Euler, the Swiss mathematician, and Hamilton, the Scotch philosopher and metaphysician, were examples of great memory. George D. Prentice, the well-known American journalist, could recite from memory without mistake the whole of Kame's Elements of Criticism, Blair's Rhetoric, and Dugald Stewart's Mental Philosophy, and in six months read and translated Virgil, Horace, Sallust, Cicero's Orations, the Greek Testament, Xenophon, six books of Homer's Iliad, and several other works. These are more than are read by ordinary college students in six years of hard study.

Imagination is that faculty which constructs images or representations in the mind by enlarging, diminishing, combining or separating ideas and objects formerly perceived. Imagination creates nothing absolutely new, only forms new images from old perceptions. It is a very useful power ; it is useful in the mechanical arts, in invention and discovery, in mathematics and in fine arts, as sculpture, painting, music and poetry. Many phenomena have been

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explained by imagining certain conditions and relations, and afterward confirming them by observation and experiment. It is useful in morals, as a high standard may be imagined as an ideal toward which the soul may strive to climb. The power may be cultivated by studying the works of nature and art, and the deeds of the good and great. The study of a high grade of literature by suggesting images to the mind, is a great aid to the imagination.

Fancy, or phantasy, is a form of mental representation in which the images formed are separated from the usual relations of thought. It is considered by some to be the same as imagination. Schuyler groups under this head several states which are the result usually of a diseased or over sensitive nervous system. He groups under the head of phantasies of wakefulness, reverie, hallucination, intoxication, and insanity ; and under phantasies of sleep, dreaming, nightmare and somnambulism.

The faculty of *reverie* is exercised when the mind and body are in a state of lassitude, and the higher acts of thought and will are suspended. It is a kind of day dreaming in which the images are determined by the sensations passively received through the senses. Poets are given to reverie. Abstraction is closely allied to reverie. It is the reflection of a philosophic mind upon its own ideas. Reverie is poetical, and abstraction is philosophical day-dreaming.

Some interesting examples are on record of philosophical abstraction, or as it is sometimes called, absent-mindedness. Dr. Robert Hamilton, a well known Scotch professor, it is said, would often meet his wife in the street and not recognize her, and when she would speak to him, take off his hat and apologize for not having the pleasure of her acquaintance. He would run against a cow in the

road and turn round begging pardon, addressing the animal as "Madam." Sometimes he would run against posts and chide them for not getting out of his way. Most students and scholars are guilty at times of fits of abstraction.

Hallucination arises from a diseased state of the nervous system. Under such circumstances persons see specters or ghosts, apparitions, or phantoms.

Intoxication is the peculiar state of the mind resulting from the use of alcoholic or other narcotic stimulants. Under this condition the mind seems to have for a brief time unusual power to form images. Coleridge wrote a beautiful poem when under the influence of opium. Intoxication is really a temporary insanity.

Insanity is a peculiar unnatural state of mind resulting from disease of the nervous system, and continued for an indefinite period.

Dreaming is the action of the mind during sleep. Perfectly sound sleep is dreamless. The mind in dreaming is only partially in action. Dreams are modified by external causes; thus thunder may cause a dream of battle. Dr. Reid had a blister on his head and dreamed of being scalped by Indians.

Nightmare is an intensified form of dreaming in which the person imagines himself in a distressing situation and is unable to help himself. It results from imperfect circulation of the blood. Anything which prevents sound sleep will be a cause of dreaming.

Somnambulism is a condition in which the person performs during sleep, actions which belong to the waking state, as walking, climbing, etc.

The logical intellectual faculties are conception, judgment, and reason. "Conception is the forming or bringing an image or idea into the mind by an effort of the will. It is distinguished from sensation and perception, produced

by an object presented to the senses ; and from imagination, which is the joining together of ideas in new ways ; it is distinguished from memory by not having the feeling of past time connected with the idea." A *judgment* is the perception of relation between two objects of thought ; reasoning by which the mind arrives at the truth or falsity of a proposition. We reason by induction and by deduction. In induction we observe a number of facts as individuals, and by analogy extend what is true of them to others of the same kind and thus arrive at general principles or laws. In deduction we begin with a general principle and seek to connect it with some particular case by means of other cases which are connected with both, thus bringing the general down into the particular. Franklin observed the fact that the electrical machine produced certain effects, and that the lightning produced similar effects, but on a larger scale. He connected the two facts together by induction, arrived at the conclusion that lightning and electricity were identical. He discovered the general law that electricity was attracted to sharp points and was conveyed away by certain substances, and from this he arrived by deduction at the fact that dwellings might be protected by lightning rods.

The sensibilities, or feelings, are classified as physical, vital and psychical. The physical feelings are sensations, instincts, and appetites.

Sensations are those feelings which are caused by excitement of some portion of the system by the action of a stimulus. They may be classed as general and special. The general sensations are those pertaining respectively to the muscular, the nervous, the nutritive, the circulatory and the respiratory systems. The special sensations are smell, taste, touch, hearing and sight.

Instincts are blind impulses to action, and are especially

characteristic of the lower animals. Thus we say the chick picks up a particle of food, the young mammal sucks the breasts of its mother, the bird builds its nest, by instinct. The evolutionist regards instinct as an inherited habit which the remote ancestors of the animal learned by experience.

Appetites are the longings or cravings caused by the necessities of organic existence. They are distinguished from sensations by their periodicity, and by the fact that they are directed to the end of satisfying wants.

The vital feelings are those "induced by the states of rest or fatigue, vigor or languor, health or sickness, and by those more permanent states called temperaments." By temperament we mean a quality of the constitution supposed to depend upon the predominance of one or more of the vital systems. The older writers described four simple temperaments; (1) The *sanguine*, characterized by predominance of the respiratory and circulatory systems, and indicated by a strong and rapid pulse, plump figure, ruddy skin, light eyes and fine hair, a cheerful disposition; (2) The *bilious*, characterized by predominance of the nutritive system, with strong pulse, dark skin, hair and eyes, strong passions, great will power and energy of character; (3) The *lymphatic*, characterized by great proportion of the fluids of the body resulting from active secreting organs, and indicated by a well-rounded form, fatness, and soft skin, and an easy, indolent disposition; (4) The *nervous*, characterized by a predominance of the nervous system, and indicated by slenderness, fine, light hair, narrow chest, and great mental activity. The majority of persons have a combination of two or more of these temperaments. Marriages between persons of similar temperaments are supposed to be unfavorable to the production of well-developed offspring.

The psychical feelings are those related to the soul, and consist of emotions, affections and desires. *Emotions* are agitations of the soul usually attended with pleasure or pain, which do not seek to bring something to the possessor as does desire, nor yet seek to go out to some object, as does affection. Of the emotions arising from general conditions we have cheerfulness, dejection, gladness, depression, joy, sorrow, self-satisfaction, self-dissatisfaction, exultation, chagrin, etc., depending upon the state of health, circumstances in life, and natural disposition. Of the emotions which may be called æsthetical, we have the emotions awakened by the novel and curious, by wit, humor, and ridicule, by harmony and grace, by contrast, by regularity and symmetry, by beauty of form and color, by agreeable flavors and odors, etc. Of the emotions which may be termed ethical, are those which proceed from the knowledge of the real nature of the mind, of law and revelation, and those which flow from good or evil acts.

Affection is defined by Schuyler as "in general, either love or hatred of an object." He makes two classes, those based on love, or the benevolent affections, and those based upon hate, or malevolent affections. Of the benevolent affections we have sympathy, pity, compassion, mercy, gratitude, thankfulness, esteem, friendship, self-love, conjugal love, parental love, fraternal love, philanthropy, patriotism, love of home and piety. Of the malevolent affections we have dislike, antipathy, contempt, scorn, disdain, envy, jealousy, malice, resentment, hatred, anger, wrath, rage, fury and revenge.

Desire is a craving for something one does not possess. Aversion is the opposite or negative of desire. Desires may be classed as general, special, and compound. Of the first class are the desires for happiness, for usefulness, and for perfection. The special desires are the desire for

knowledge, the desire for wealth or acquisitiveness, which when of undue degree becomes avarice or covetousness, and the desire for power and fame, commonly known as ambition. The compound desires are hope and fear. "Hope is the desire and expectation of good." Faith and trust are closely allied to hope. Faith is the confidence we place in that from which we hope to realize some desire. Fear is the aversion of expected evil. Anxiety, apprehension, alarm, dread, terror, horror and despair are varieties of fear.

Of the third division of the mind, the *will*, I shall have but little to say. The will is 'that faculty which acts, determines, decides, choosing between alternatives. The mind is not a mere machine, which acts only as it is acted upon, but it is automatic, that is, self-acting. The question is the will free, has been much discussed. If the will is not free then man is not responsible for his acts, and it would be wrong to punish men for crimes. The will often decides contrary to the dictates of reason and judgment. Freedom is a necessary condition of responsibility. A man is commendable or censurable for his choice since he is free to act as he chooses.



CHAPTER VII.

MARKED MENTAL PECULIARITIES.

MENTAL PRODIGIES.

In the preceding chapter I instanced a few cases of remarkable memory. Such cases belong to only one class of mental prodigies. It is often said that poets are born, not made. There is much truth in this, and it may with equal propriety be said of musicians, artists, mathematicians and mechanics. There are at least a number of cases on record of persons who developed at a very early age remarkable powers in these lines, and that without instruction from others. Many of my readers have heard of so-called "calculating boys," and among the number is Zerah Colburn. This remarkable child before the age of nine years, could perform extraordinary feats with numbers. Thus he could mentally multiply the number eight into itself fifteen times and give the correct result in a few minutes. He could extract the cube root of 268,336,125 before the number could be written down. He was asked to name two numbers which, multiplied together, would give 247,483, and he at once named 941 and 263, which are the only numbers satisfying this condition. George Bidder, an English boy, was in many respects more remarkable than Colburn. He could multiply mentally a number containing fifteen digits by another number of as many digits, and give the correct result in a few moments.

Many other examples of mathematical prodigies might be mentioned, but these are, perhaps, the most remarkable. What is singular is the fact that with the general culture of the mind in these cases, this special numerical power faded away.

One of the greatest of musicians and musical composers was Mozart. At the age of four years he composed music, and could play difficult pieces with facility and correctness. Who has not heard of Blind Tom, the negro who displayed such remarkable musical talent? He could play correctly on the piano any tune he ever heard, and never received a lesson in music from any one. As an example of a born poet I may mention Alexander Pope. He could not remember when he first began to write verses. To use his own language, he "lisp'd in numbers, for the numbers came." Benjamin West was a natural born artist. He astonished his friends by his skill in drawing at the age of seven years, and at nine he painted a picture which he declared in after life he had not surpassed.

James Ferguson, James Watt, George Stephenson, Isaac Newton and Thomas Alva Edison are examples of men in whom the scientific, inventive and mechanical faculties were extraordinarily developed. Want of space prevents further notice of these men here, but the reader will be interested in reading their histories.

SUICIDES.

The statistics in regard to this strange crime are interesting. The extent of the crime varies with the time of life, the time of the year, the hours of the day and night, with nationality and race, and with many other conditions. It seems that within the last fifty years suicides have been on the increase in Europe and America. It is also true, as a rule, that there are more suicides among civilized than

among uncivilized people. The tendency seems to increase from youth to extreme old age. As to the time of year the maximum number occurs in June, the minimum in December. It is more frequent during the first ten days of the month, the number being greater during the first two days. There are more on the first days of the week than upon the last. There are more in daytime than at night, and more in the forenoon than in the afternoon. As a rule, it is greatest in Northern Europe, and least in Southern Europe. Ireland, however, stands low. This shows that extreme poverty is not one of the greatest causes. It is highest in Germany and Austria, especially among those speaking high German. The tendency to suicide is not great among the Jews. It is less among Catholics than among Protestants. The rate seems to tally closely with the number of children in schools, with the number of newspapers and periodicals, and with the number of railroads. It is greatly increased during years of famine and financial depression. It is more frequent in cities than in the country, and among men than among women. It is more frequent among widows and widowers than among spinsters and bachelors, and more frequent among the married than among the single. It is less among those who have children than among those who have none. It is most frequent among the industrial classes. In the Italian army it is more frequent among officers than among men.

The causes of suicide are numerous. The French statistics enumerate 60, and the Italians 25. One-third of the total of suicides seems to be caused by mental disorders, among which may be mentioned brain fever, monomania, insanity, imbecility, religious exaltation, and political fanaticism. Seven per cent. are due to drunkenness, and twelve per cent. to financial embarrassment.

As to the means commonly employed, it is curious to know that hanging stands first, followed in the order of prominence by drowning, gunshots, cutting the throat and stabbing, poison, jumping from a height, choking, throwing bodies on railroad tracks, and miscellaneous means. The poisons generally used are prussic acid, cyanide of potassium, laudanum, oxalic acid, arsenic and strychnine. Women prefer drowning and poison, men, hanging and shooting.

EPIDEMIC DELUSIONS.

Says Dr. Carpenter, "The will has the same kind of influence over the mind, as the rider has upon his horse; the powers and activities of the mind are in a great degree independent of will; the mind goes on of itself when started by the will. Ignorance and want of habit of self-control which commonly accompanies it, predispose it very greatly to the violent excitement of the feelings, and to the possession of the mind by ideas which we regard as essentially absurd, and under these states of excitement of feeling, and the tendency of these dominant ideas to acquire possession of the intellect, the strangest aberrations take place in individuals and communities." He then cites a number of cases of the so called epidemic delusions. One of the girls at work in a factory in Lancashire, England, was thrown into a fit by another girl putting a mouse down her back. Several other girls were immediately seized by similar fits, and then a notion got started that the convulsions were caused by emanations from a bale of cotton, and in a short time nearly every girl in the factory was seized with convulsions. A physician was called and cured them all by administering electric shocks. In a hospital at Bristol, a number of girls were kept in one ward, and when one took a hysterical fit all the rest were affected in the same manner. They were cured by threats of punish-

ment. In another case where there were a number of girls one began to mew like a cat, and all the rest did the same. In another case where one began to bite, all the rest fell to biting each other. At one time this biting mania spread from one nunnery to another throughout the whole of Germany. Medical men soon cured it by threats of punishment. Boerhaave, the celebrated physician, on such an occasion heated a poker in the fire, and threatened to burn the next one who fell into a fit. The threat was effectual in preventing further convulsions.

Many of the great so called religious revivals where hundreds are affected in a peculiar manner, falling to the ground insensible, or seized with violent twitchings of the muscles, may be explained on this principle of violent feeling overcoming will power.



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